Coal Age

APRIL, 1954

A McGRAW-HILL PUBLICATION — PRICE 50c

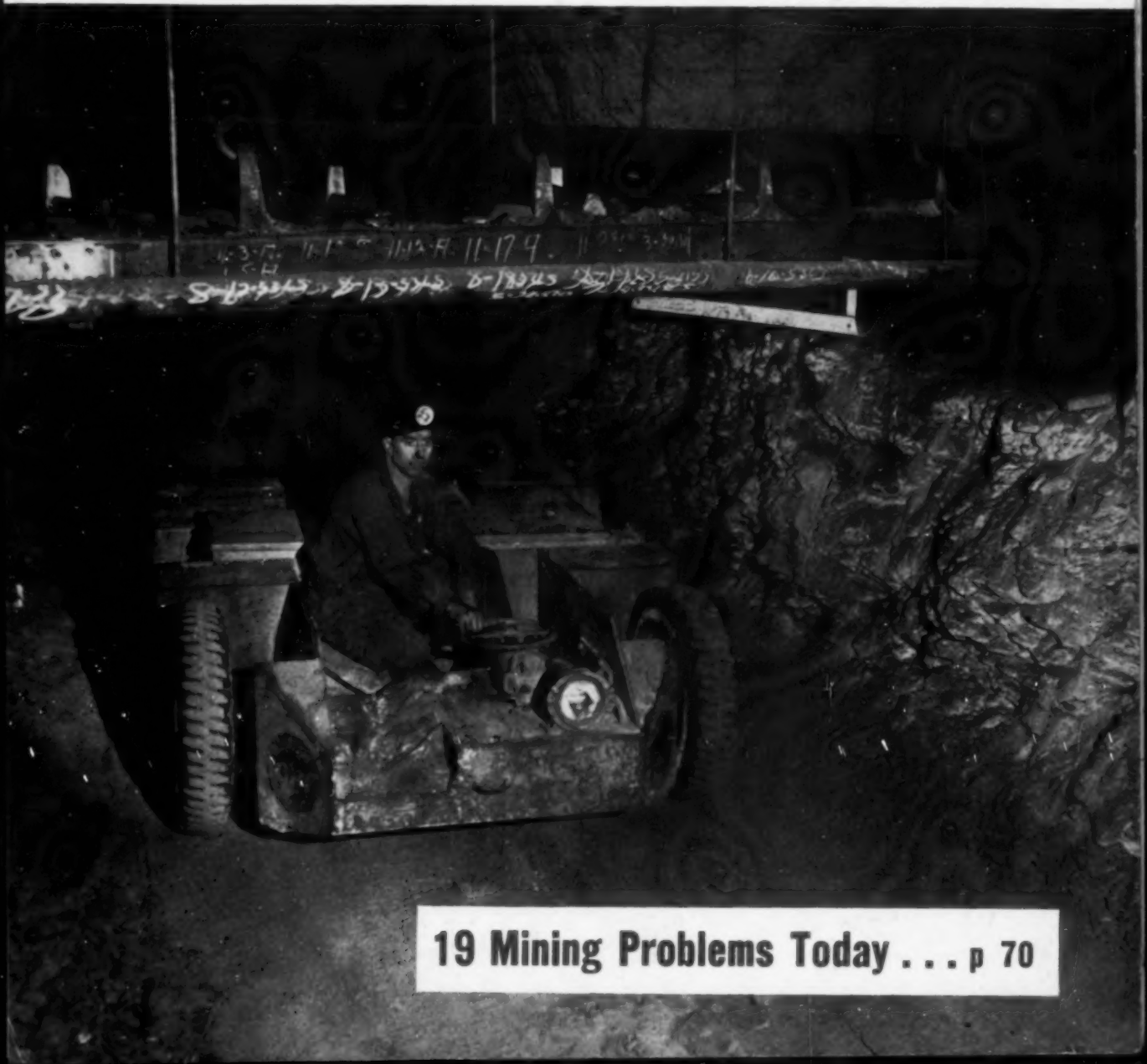
Freeman No. 4 Mine

New 4,000-tpd property gets high output per man by modern methods, schedules development for future expansion. p 78

Maintenance Works

How Pittsburgh Coal makes its program effective, gains from the interest and ideas of all employees. p 96

Full Contents on p 5



19 Mining Problems Today . . . p 70

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Economical!

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because it

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An investment in A.C.F. Mine Cars is made even sounder by simplicity of design ...by highly profitable (1 ton a second) unloading speed...by unique adaptability to the job. A.C.F. Mine Cars are used to haul men and supplies in...coal out. A.C.F. Mine Cars can be quickly and easily repaired (on-the-spot!) by your own men.

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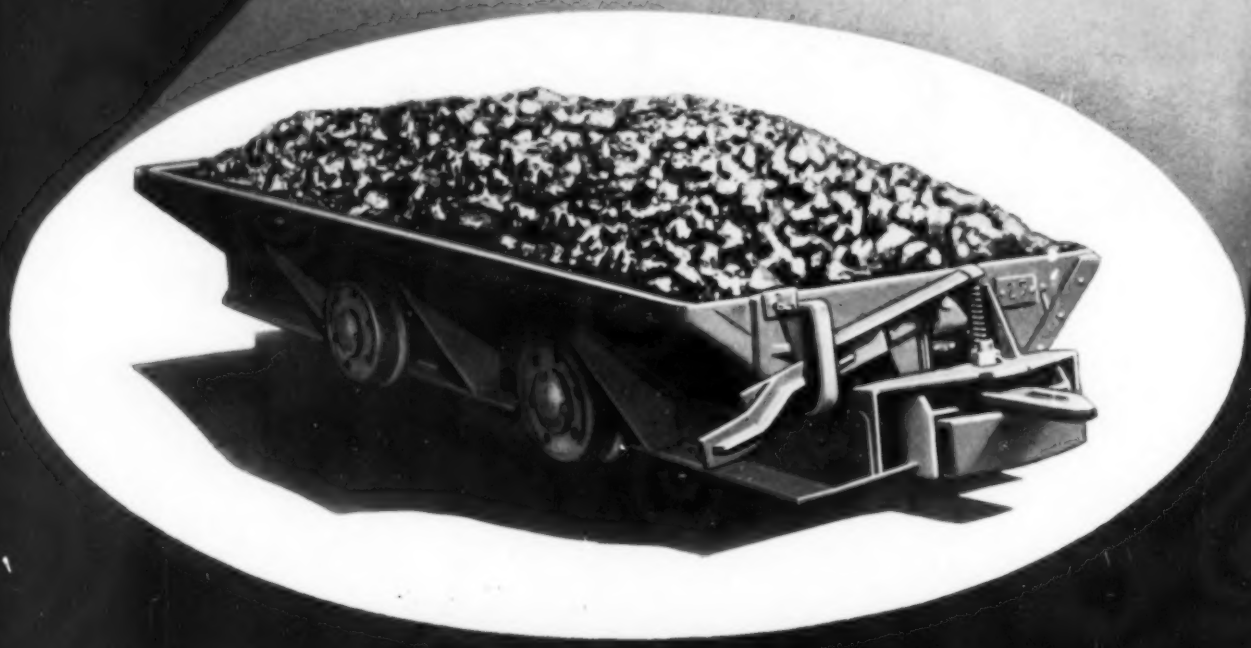

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for Constant Haulage

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20 million tons in 14 years B. F. Goodrich belt still at work

If you need a conveyor belt that will stand any kind of coal-handling job, whether above ground or below, B. F. Goodrich has developed just the belt for you. It's the B. F. Goodrich *cord* conveyor belt.

Layers of separate cords, each surrounded by rubber, run the length of the belt. This makes the belt strong to carry heavy loads, yet flexible enough to trough perfectly even if running empty. When the belt is slammed with heavy chunks, the cords "give"—roll with the punch—then the flexible rubber brings the belt back to normal carrying shape.

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That's why the B. F. Goodrich cord belt in the picture has hauled 20 million tons in 14 years. Why it has carried all kinds of coal from razor sharp slivers to huge chunks without once causing a shutdown.

These are just a few of the reasons why the B. F. Goodrich cord belt designed for coal handling can do the job better, for less. For information on the full line of cord and fabric Caricoal belts, see your BFG distributor. He will show you how these longer-lasting conveyor belts can save you money. *The B. F. Goodrich Company, Dept. M-209, Akron 18, Ohio.*

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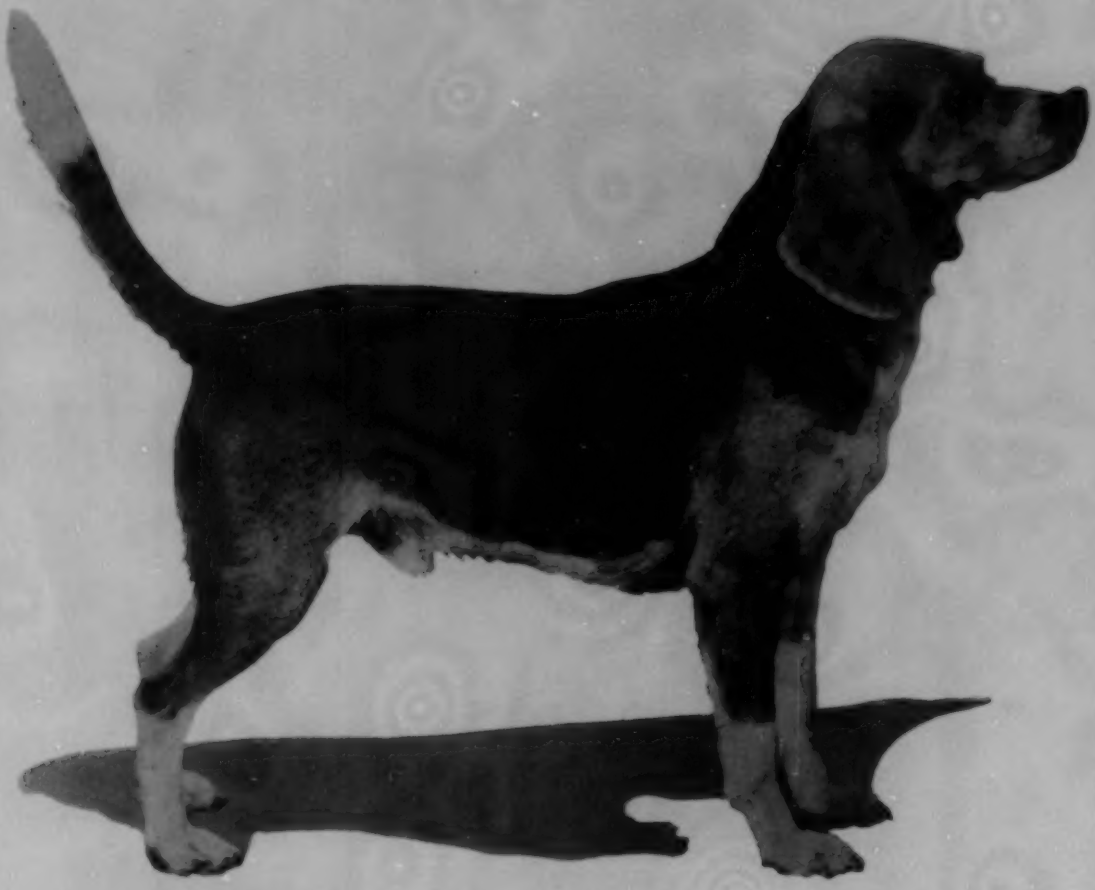
INDUSTRIAL PRODUCTS DIVISION

A Field Champion is known by his



FIELD CHAMPION

GUNNER'S MATE JO-JOE

Owner:

RICHARD TODHUNTER, JR.

It takes performance plus pedigree to make a field champion. And those qualities come from years of selection, training, and experience. Typical of our topic is FD. CH. GUNNER's MATE JO-JOE, a field champion from a long line of champions. Competing in the stiff NATIONAL 3-hour Pack Stake at Aldie, Virginia against the choicest beagle pack hounds in America, JO-JOE was judged BEST. Yes sir, you can really tell a field champion by his performance in the field.

HULBURT OIL & GREASE COMPANY

PHILADELPHIA, PA.

Specialists in Coal Mine Lubrication

Field PERFORMANCE

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QUALITY LUBRICANTS

Hulburt Quality Lubricants are the "champion" of their specialized field of coal mining machinery. That's because of their performance in the field and pedigree. By "pedigree" we mean the long years of experience—and specialization—and laboratory-tested and mine-tested improvements that have gone into them. And as to performance . . . Hulburt Quality Lubricants are always judged BEST by really experienced coal mine operators who recognize the importance of field performance.

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— the name that preparation plant operators are using to describe equipment for *continuous* and uniformly thorough dewatering of fine coal at lowest cost per ton.
BIRDS run for months without a shutdown — no screens, no sludge tanks, no auxiliaries. Maintenance averages less than 2 cents a ton.
Bird Coal Filters are likely to be best for you, too. Get the facts and figures and you'll see why.
BIRD MACHINE COMPANY
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Coal Age

APRIL • 1954

Editorial: **More . . . Or Less?** 60

19 Mining Problems Today 70

The 50 Biggest Mines in 1953 77

Freeman No. 4 Applies Modern Methods 78

AMC 1954 Coal Convention 85

Consol's Clean Cleaning Plant—J. H. EDWARDS 86

Yielding Steel Rings for a Tunnel—C. S. KUEBLER 92

Pittsburgh Coal's Maintenance—A. E. FLOWERS 96

Concurrent Roof Bolting With Continuous Mining 102

Keeping Strip Equipment at Work 104

Foremen's Forum: **Seven Sins in Supervision** 108

Operating Ideas: **Plywood Speeds Stoppings** 112

Oil Barrels Cut Cost of Concrete Pier Forms 114

How to Recharge a Repaired Battery Cell 114

Automatic Take-Ups at Lower Ends of Belts 116

Direct Pull on Hoist Lengthens Rope Service 116

How to Make an Impact-Wrench Tester 116

Can You Get More From Your Tractors? 117

Electric Companies' Case for Public Confidence 118

Equipment News and Bulletins 120 *News Round-Up* 135

Cost-Cutting With Safety

COMING UP IN MAY is the eighth feature in the *Coal Age* Cost-Cutting Series, which began in January, 1953. The theme in May is how safety can cut cost. It will go into organization for safety, development of the safety spirit, elimination of physical hazards, the benefits to be derived from safe operation.

Production-Line Mining

THE NEW ORIENT NO. 3 MINE of the Chicago, Wilmington & Franklin Coal Co., at Waltonville, Ill., is an outstanding example of the design of a new operation for production-line mining. With pictures, maps and circuit diagrams, the editors report on how the company went about backing up continuous-mining equipment with power to do the job, good transportation and modern preparation. Incidentally, the miners are successfully extracting pillars in the Illinois No. 6 seam, and the coal is brought to the surface by the longest, highest-lift belt slope in the industry.

High-Capacity Stripping

THE CHOICE is still being made, but the May issue of *Coal Age* will include one or the other of two modern high-capacity strippings—one new and one recently re-equipped to achieve a significant reduction in operating cost. How, why and what with will be the keynotes in the editors' reports, one for May and one for a following issue.

And Further in May . . .

Coal Age will present a study of a new-type launder that provides high efficiency in cleaning fine coal, the story of a custom overhaul shop providing the industry with a new service, and a report of how lubricating wire ropes actually works for longer life and greater safety.

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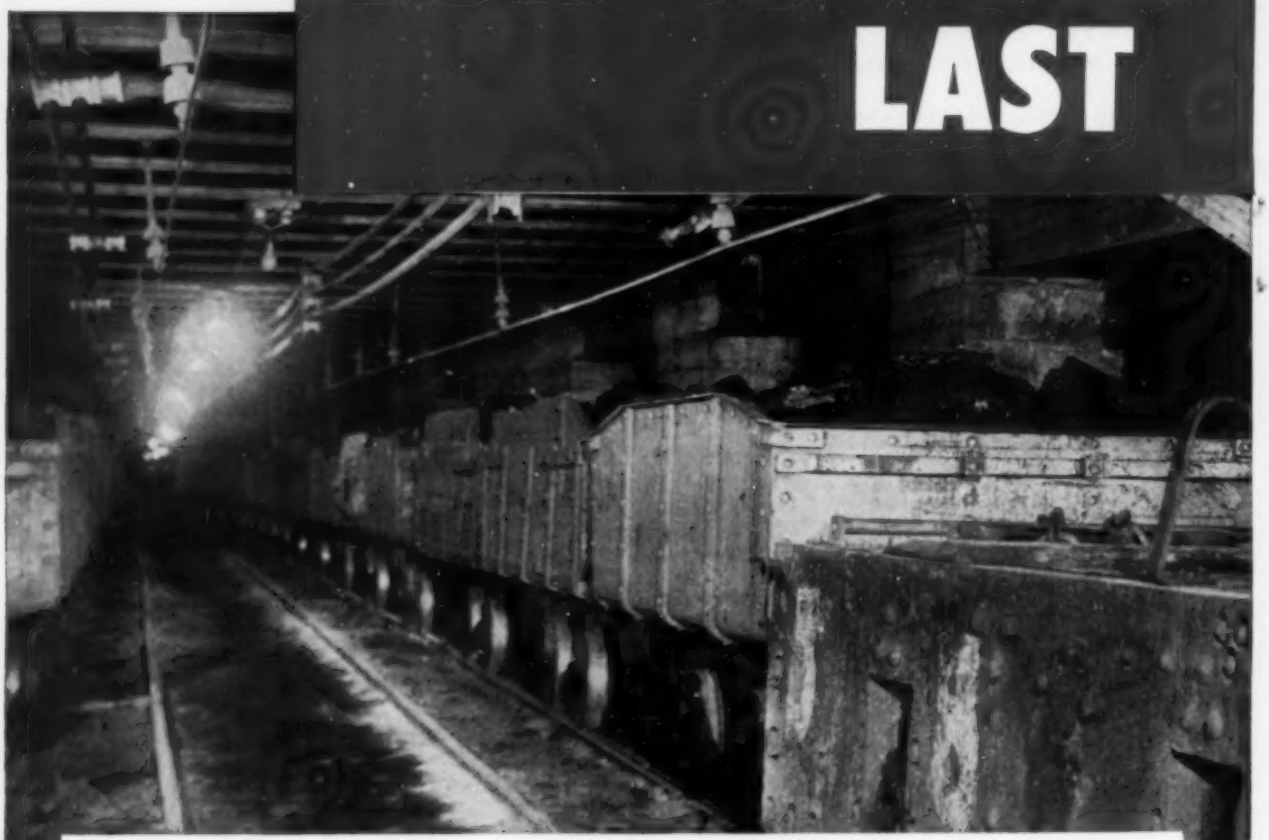

USE TEXACO REGAL STARFAK — the premium-quality lubricant that is head-and-shoulders above ordinary grease for anti-friction bearings in locomotives, cutters, loaders and similar equipment. You'll get more lasting protection against wear . . . assure easier starts and smoother running . . . increase bearing life and reduce maintenance costs.

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Let a Texaco Lubrication Engineer help you increase production efficiency, cut operating costs. Just call the nearest of the more than 2,000 Texaco Distributing Plants in the 48 States, or write The Texas Company, 135 East 42nd Street, New York 17, N. Y.

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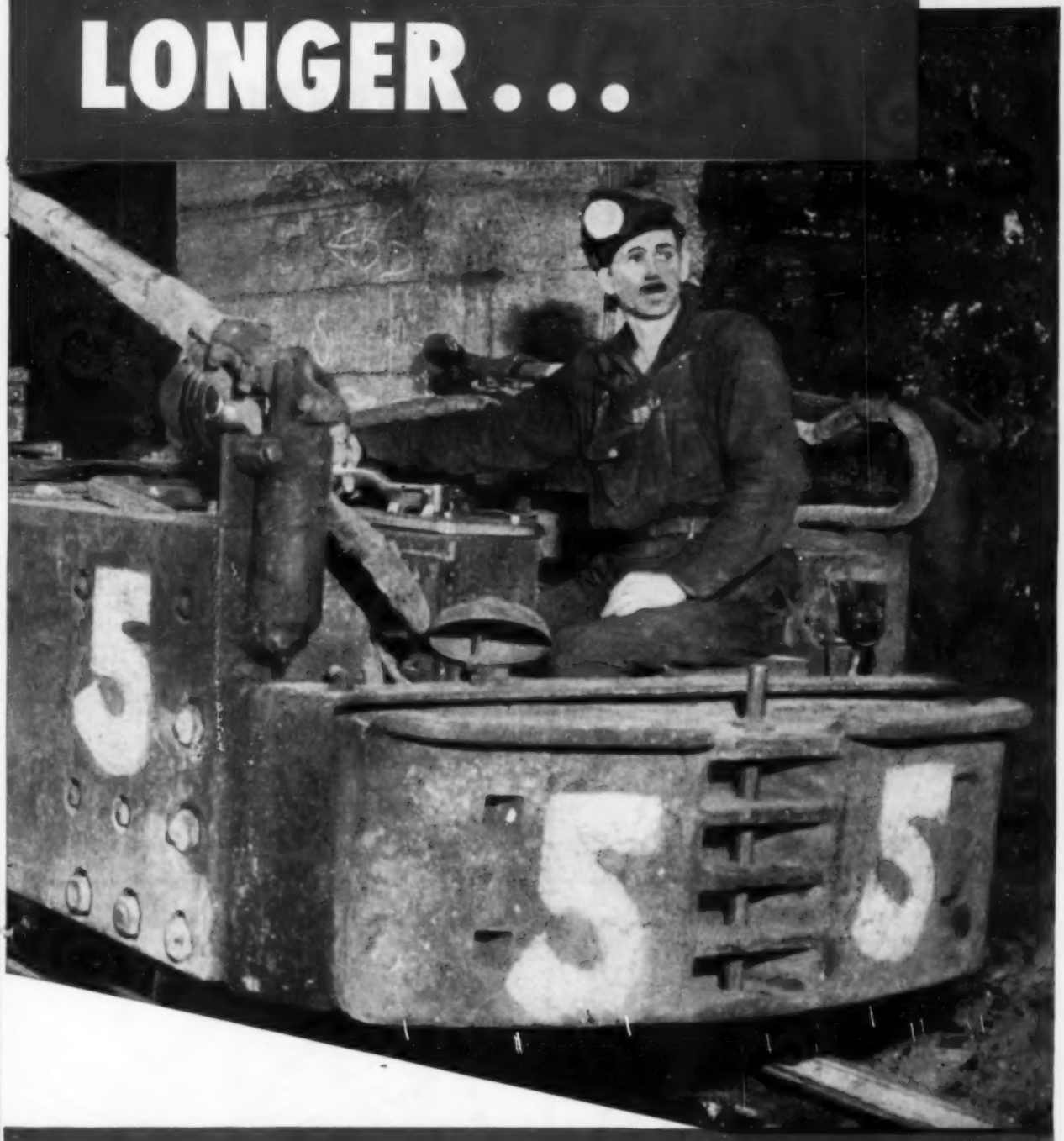
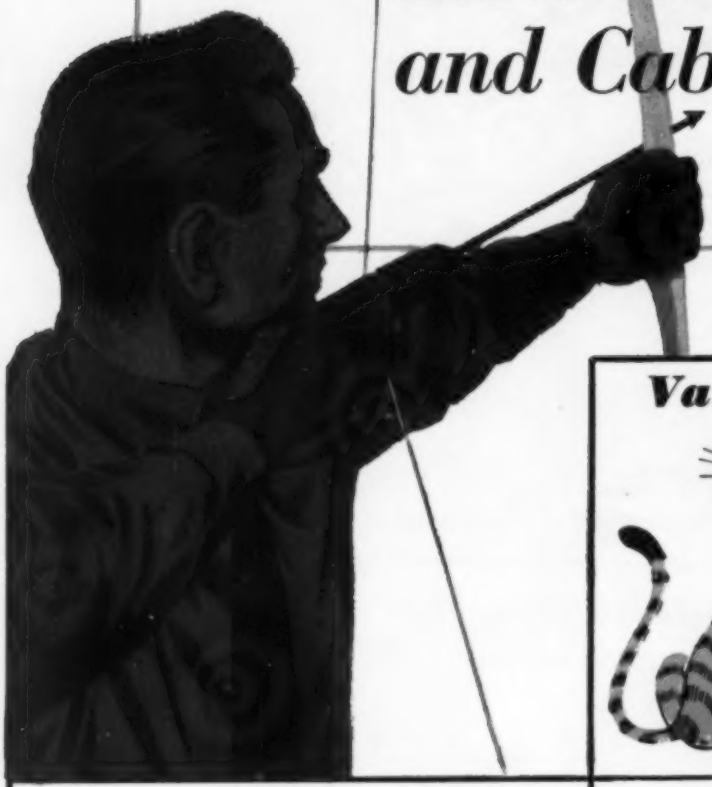


LUBRICANTS for the Coal Mining Industry

You just can't miss with

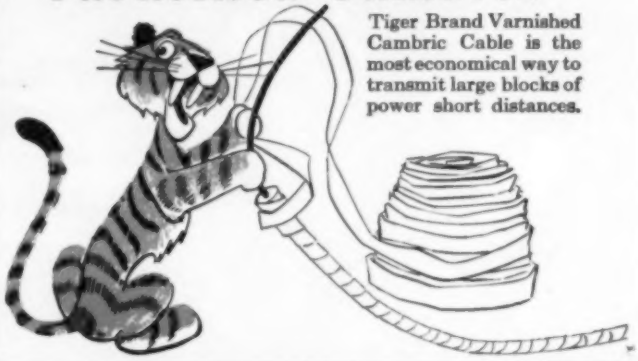
Tiger Brand

Electrical Wire and Cable



Varnished Cambric

Tiger Brand Varnished Cambric Cable is the most economical way to transmit large blocks of power short distances.



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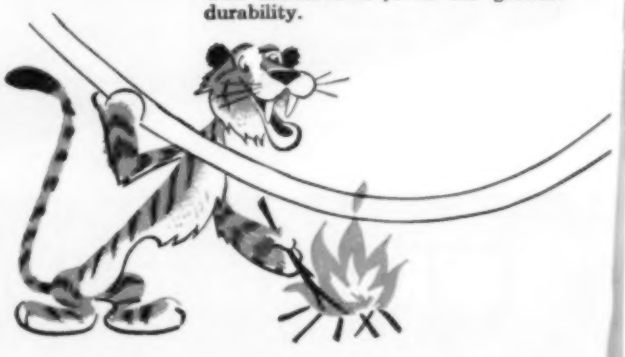
To withstand physical abuse, moisture, sun and oil, use Tiger Brand Amerclad for all sorts of portable equipment.

Amerbestos

Tiger Brand Amerbestos is a true *quality* heat resistant material. The asbestos is *felted* for greater durability.



Submarine For underwater power distribution, there's a Tiger Brand Submarine Cable to withstand any operating condition.

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Tiger Brand Ampyrol features thin-walled thermoplastic insulation, brilliantly color coded, easy to strip.

Paper

Leading utilities specify Tiger Brand Paper Insulated Cable for their most critical high voltage installations.

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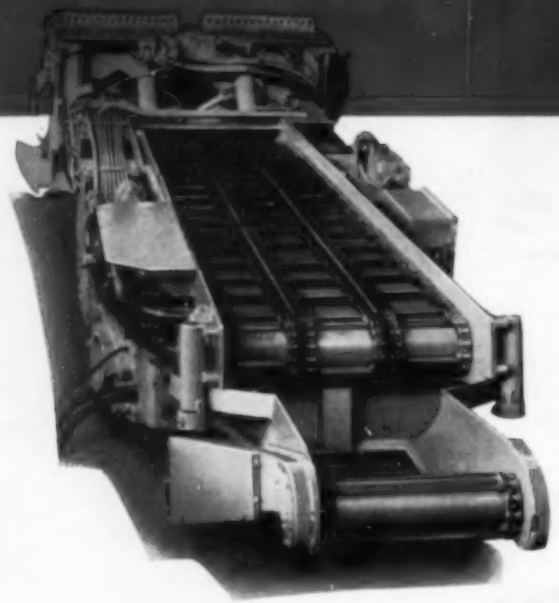
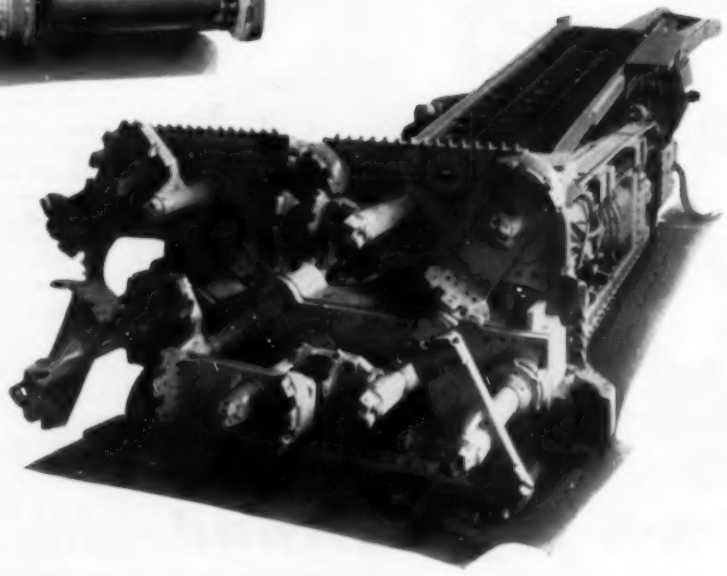


DISCHARGE END OF 76-B COLMOL. On this medium-high machine, the discharge conveyor will swing 31 degrees either side of center for easy loading of shuttle cars.

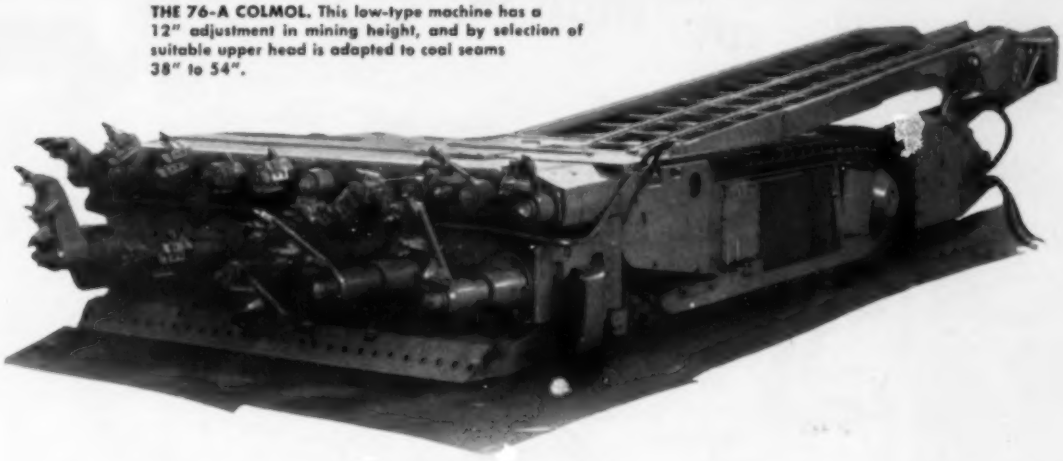


THE HUSKY 76-B COLMOL, medium-high type. Upper and lower heads, each with five arms, separate to adjust to different coal heights. Heads can be tilted as unit to follow rolls in bottom.

powerful • rugged • compact

JEFFREY COLMOL

THE 76-A COLMOL. This low-type machine has a 12" adjustment in mining height, and by selection of suitable upper head is adapted to coal seams 38" to 54".



The Jeffrey COLMOL is revolutionizing mining methods. It mines and loads in one operation, eliminating the use of explosives.

Built in low and medium-high types for seams 38" to 72", the COLMOL produces 35 to 80 tons per man-shift, depending on mine conditions. Under optimum conditions, a COLMOL recently mined more than 900 tons of raw coal in a single shift!

Such high productive capacity means low mining cost per ton. Maintenance costs are low too. Time is saved by combining mining and loading . . . eliminating the separate operations of cutting, drilling, shooting and loading.

Simplified controls make the COLMOL easy to operate . . . cut down on operator fatigue. Low RPM breaker arms, together with well-designed water spraying system, reduce dust hazard while COLMOL advances in seam.

Write for complete information and specifications.

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IF IT'S MINED, PROCESSED OR MOVED . . . IT'S A JOB FOR JEFFREY!

More tons per man..

A boring type continuous mining machine for all development and for full production work in any mining system.
GOODMAN
TYPE 500
MINER

Goodman Boring Type Miners will be available for both low and high seams; also a cutting head having sufficient retraction to allow maneuvering the machine where heavy cross barring and posting is required.

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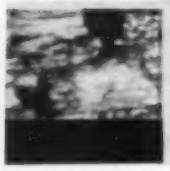
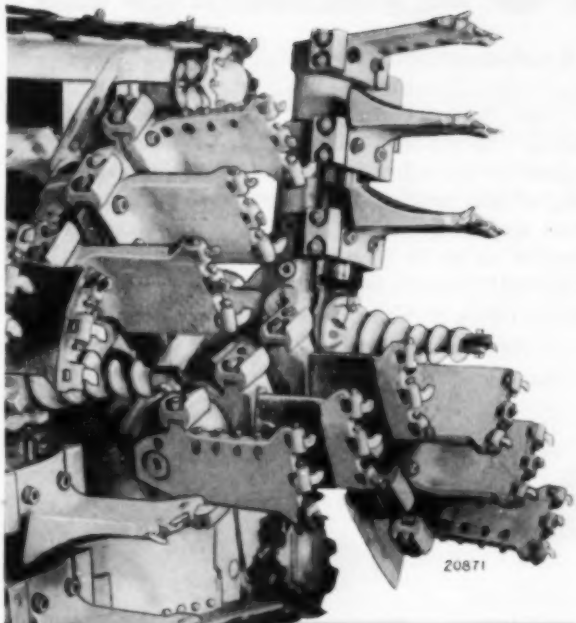


..lower cost per ton

with the GOODMAN type 500 MINER

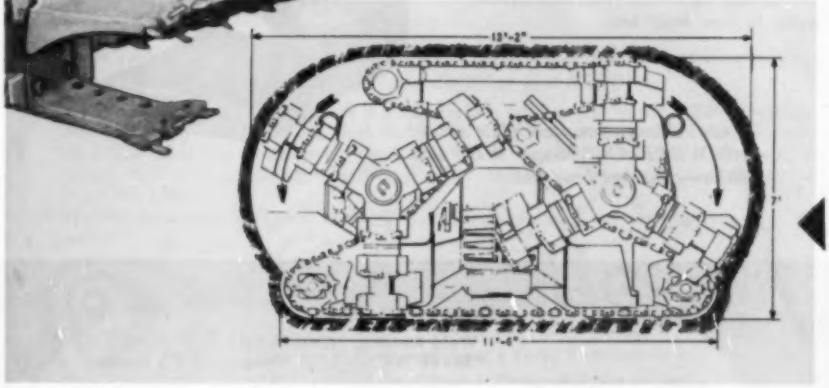


- **cuts and loads up to 7 tons per minute from the solid, unprepared seam**
- **produces high percentage of lump coal, with unusually low percentage of fines**
- **cuts wide path at a single thrust without swing or maneuver**
- **crosscuts can be turned at 90° angles; seam irregularities can be followed by vertical or lateral tilt of entire cutting element**
- **for ease in withdrawing from cut and for tramming, clearance at top and sides is provided by retraction of cutting units**
- **cutting arms rotate at 14 rpm, a safe rate with no rapidly moving parts, no flying coal. Dust is at a minimum, easily spray controlled**

A rugged machine of surplus power and capacity. Simplicity and strength, with fewer and stronger parts than most mining machinery, promotes maintenance economy.

A completely flexible machine. Maneuverability is made fully effective by reversible tractor treads, conveyor swing, retraction and tilting of cutting units.

A unique hydraulic system consisting of three pumps, each of which can be operated by finger-tip control for (1) tramming; (2) conveyor chain motion; (3) cylinders that motivate tilting, retraction and conveyor swing.



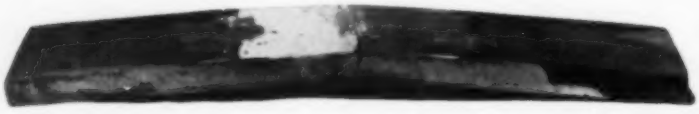
The path it cuts is arched at sides and top corners for strong roof support, and is wide and flat at the bottom completely cleaned for a good roadway.

WEAR-ARC "SUPER WH"

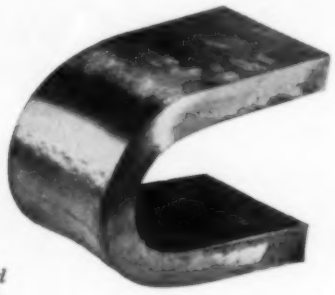
FOR MANGANESE

WEAR-ARC "Super WH"—the new electrode that combines strength, ductility, impact and abrasion resistance . . .

As a result of more than two years of research development and field tests, the Alloy Rods Company proudly announces Wear-Arc "Super WH" as a truly revolutionary electrode with superior strength and wear properties. The core wire, which is melted especially to Alloy Rods Company specifications, contains approximately 33% alloy . . . balanced in proportions never before conceived in a hard facing electrode. This entirely new alloy has a carbon content of only 0.35% but develops an equivalent hardness of alloy steels containing *three times* this carbon content. Those experienced in the hard facing field will recognize the advantage of a low carbon alloy in preventing spalling and flaking of the weld deposit under operating conditions requiring severe impact. With abrasion resistance *up to four times* over manganese steel, "Super WH", which operates on either AC or DC current, offers a new concept of values in the impact-abrasion hard facing field that will serve as a standard for the future.



(Above) Manganese steel plate welded with 14% manganese electrodes—maximum bend obtainable in free bend test.



(Right) Manganese steel plate welded with WEAR-ARC "Super WH" electrodes—after free bend test.

VISIT US AT BOOTHS 165-169

WELDING SHOW

MEMORIAL AUD. BUFFALO—MAY 5-7

WEAR-ARC "Super WH"—the new electrode that has better physical properties than any other electrode for welding manganese steel . . .

The table shows the amazing physical properties of "Super WH" as compared to heat treated manganese steel plate and the best manganese steel electrode that was available before the development of WEAR-ARC "Super WH".

	Weld Metal "SUPER WH"	Weld Metal 14% Mang.	Plate 14% Mang.
Condition of Material Tested	As welded	As welded	Heat treated
Tensile Strength (psi)	130,000-140,000	85,000-90,000	80,000-130,000
Yield Strength (psi)	85,000-90,000	45,000-55,000	45,000-55,000
% Elongation (Free Bend)	40.0%-45.0%	8.0%-15.0%	35.0%-45.0%
Carbon Content	0.35%	0.80%	1.00%
Wear Resistance Factor*	(work hardened) 2.20 to 4.10	(work hardened) 0.86 to 0.93	(work hardened) 1.00
Rockwell C Hardness (Average)			
As Welded	23.5	19.0	18.5
Work Hardened	48.5	47.0	48.0

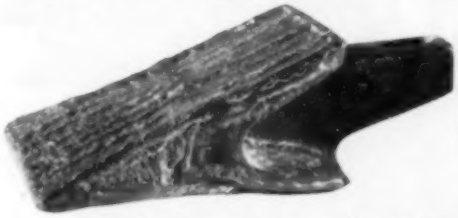
*Ability to resist wear as compared to work hardened manganese plate. Higher figures represent greater resistance to wear.

REVOLUTIONARY *new* ELECTRODE

STEEL WELDING

WEAR-ARC "Super WH"—the new electrode that is two electrodes in one for maximum weld strength and maximum wear resistance . . .

Now only one type of electrode is necessary for attachment welding and hard facing. "Super WH" eliminates the necessity of using stainless steel or other types of electrodes for strength welds and manganese steel electrodes for wear resistance. "Super WH" will join manganese to itself or to any other type of steel with greater strength and rigidity than stainless steel and at the same time outwear the weld deposit of any manganese steel electrode *four to one*. Under normal welding conditions, it is impossible to obtain cracks in the root or subsequent passes when using "Super WH". Those who have attempted to use manganese steel electrodes for welding root passes will welcome this great electrode which also outwears any work hardening electrode ever developed.



(Left) A repointer bar has been welded in place on a worn tooth and then the entire area has been resurfaced—"Super WH" electrodes were used for both operations.

(Right) These teeth were subject to the same number of hours of service in handling approximately 12,000 tons of large rock. The worn tooth on the left was welded with 14% manganese electrodes, the one on the right was welded with "Super WH" electrodes.

***SPECIAL INTRODUCTORY OFFER...* Now prove the cost-saving advantages of new WEAR-ARC "Super WH"—and do it for just $5.90!**

At this sensational low price we'll send you ten pounds of "Super WH" electrodes (in any one of the three diameters) packed in a hermetically sealed metal container—and that $5.90 includes shipping charges anywhere in the United States. *But act fast*—fill in coupon below and enclose check or money order *today* . . . special introductory offer ends May 15, 1954.

See your Alloy Rods distributor for larger quantities of the new and superior Wear-Arc "Super WH".

23

Alloy Rods Co.

General Offices and Plant • York, Pennsylvania
Pacific Coast Sales Offices & Plant • El Segundo, Calif.

ARCALOY Stainless Steel Electrodes • BRONZE-ARC Phosphor Bronze Electrodes • NICKEL-ARC Electrodes for Cast Iron • TOOL-ARC Electrodes for Tools and Dies • WEAR-ARC Hard-Facing Electrodes WELD-ARC Low Hydrogen Electrodes

no finer electrodes made . . . anywhere

Yes, I want to take advantage of your special introductory offer. I enclose $5.90 for a ten pound container of Wear-Arc "Super WH" in the following diameter: ☐ 5/32", ☐ 3/16", ☐ 1/4".

Name.....

Company Name.....

Address.....

City.....State.....

Mining equipment can do more work when it's built with

USS High Strength Steel

This Big Bucket can scoop up 30 cu. yds. of coal or overburden at one bite. This means it has to take a lot of pounding and abrasion. And it can—because it was built with USS TRI-TEN steel which insures high resistance to impact and shock, even at low temperatures, along with high strength and good welding properties.

Big-capacity COR-TEN steel cars in West Virginia mine carry 3 times the usual car load. These 15-ton COR-TEN steel cars are typical of the modern equipment and modern materials being used to cut coal mining costs. USS COR-TEN steel floor plates are ⅜" thick, side and end plates are ¼" thick—same gauge as used in carbon steel. This rugged construction, which adds no weight but greatly increases strength and durability, pays off in fewer break-downs and longer life.

Built with USS MAN-TEN steel this 28 cu. yd. capacity hydraulic dump truck body—one of the world's biggest—can carry 45 tons of coal or overburden, can dump a full load in 20 seconds and has a road speed of 32 miles per hour. Here's real ability to deliver the goods.

WITH USS High Strength Steels you can give your mining equipment the rugged durability it needs to stand the punishment of today's high speed mining operations.

These famous "steels that do more" will keep your equipment *in* operation, moving tonnage, and *out* of the maintenance shop where repairs and replacements cut into profits. For USS COR-TEN, USS MAN-TEN and USS TRI-TEN steels have a 50% higher yield point than ordinary carbon steel. In addition to greater strength they provide higher resistance to fatigue, wear, abrasion and impact.

These superior physical properties of USS High Strength Steels can be used to materially increase the strength and life of equipment without increasing its weight. Conversely, in some applications it is possible to use these tough steels in thinner sections to reduce weight without reducing strength, or to increase the size and capacity of equipment, without increasing its weight or the power needed to operate it.

Moreover, if your mining equipment must work in sub-zero temperatures, or under unusually corrosive conditions you can build it with a USS High Strength Steel that will resist these destructive forces to keep it on the job and prolong its life.

For more information or application data about USS High Strength Steels phone or write our nearest office.

UNITED STATES STEEL CORPORATION, PITTSBURGH • AMERICAN STEEL & WIRE DIVISION, CLEVELAND • COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH • TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. • UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

USS HIGH STRENGTH STEELS

USS COR-TEN • USS TRI-TEN USS **USS MAN-TEN • USS A-R STEEL**

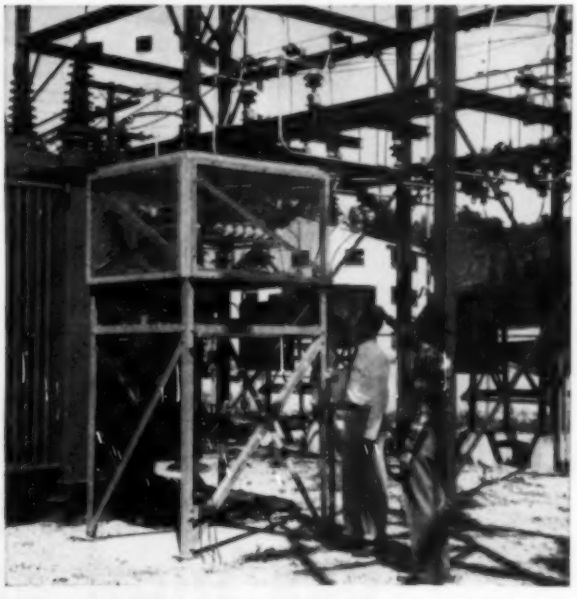
4-452

UNITED STATES STEEL

MINIMUM CYCLE TIME on this huge shovel—bucket capacity, 45 cubic yards—and other three shovels at mine is accomplished with help of pin-point control of G-E amplidyne system. Dependable G-E motors and motor-generator sets power shovels.

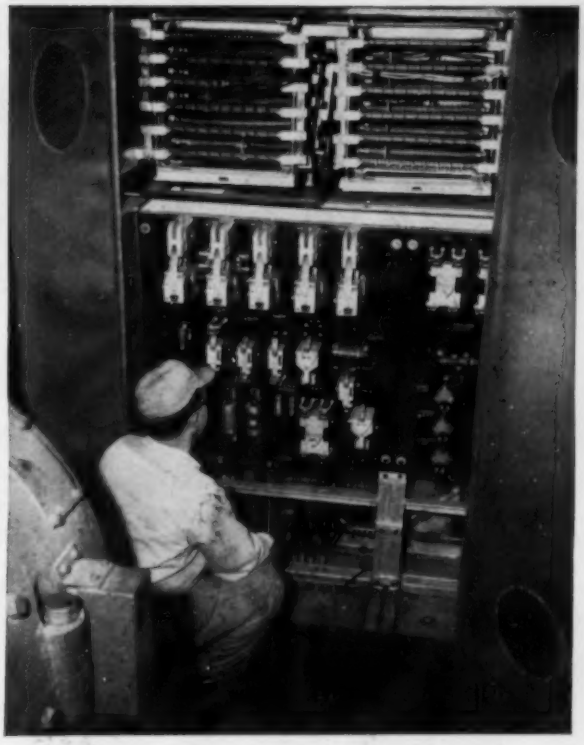
New Ohio coal mine to produce

ON-THE-SPOT CONTROL OF ENTIRE MINING OPERATION is provided by G-E 2-way radio system from Zanesville headquarters, 48 miles away. Result: outage time is kept low.



MINIMUM POWER LOSSES with this G-E substation which is located near work area. Neutral grounding assures minimum shutdown, maximum protection for personnel and equipment.

ROUND-THE-CLOCK SHOVEL OPERATION—thanks to this five-unit G-E motor-generator set. Split frames of m-g sets, specially designed for shovels, assure ease of maintenance.



INSTANTANEOUS CONTROL of shovels' hoist, swing and crowd motors provided by G-E amplidyne control. System uses fewer components, guards against torque peaks.

5,000 tons/day for power plant

General Electric equipment to help Muskingum mine reach peak output

The new Muskingum Mine, Morgan County, Ohio, soon will be furnishing 5000 tons of strip-mined coal per day to the Ohio Power Company's nearby Muskingum River Plant. In a continuous stream, the coal flows from the mine through the preparation plant, and then to the power station.

Four shovels—all powered and controlled by G-E equipment—are used at this mine. Two of them—one with a bucket capacity of 45 cubic yards—will handle the overburden to a projected highwall of 80 feet. The two smaller shovels load the coal. A G-E equipped substation provides power for the shovel operation.

To integrate the mining, processing production, the mine's Zanesville headquarters—48 miles away—uses a G-E two-way radio system. Eight units are located in the shovels, dispatch cars, and mine office.

You can take advantage of the same expert G-E electrical engineering that went into this system, no matter how large or small your mining project may be. When you specify General Electric, its many specialized services—product development, system engineering, field engineering, to name but a few—are available to you. Your local G-E Apparatus Sales Representative can tell you more. General Electric Co., Schenectady 5, New York. 663-40

Engineered Electrical Systems for Coal Mines

GENERAL ELECTRIC

INSIDE and OUT...

The Allis-Chalmers HD-15 now offers a choice of two outstanding drives — standard transmission with time-saving shift pattern, or optional hydraulic torque converter drive.

Allis-Chalmers is your BEST tractor buy

Allis-Chalmers tractors are truly modern — new from the ground up, without compromise anywhere in design or material. Built to meet today's demands, users find them more productive, more reliable, easier to operate.

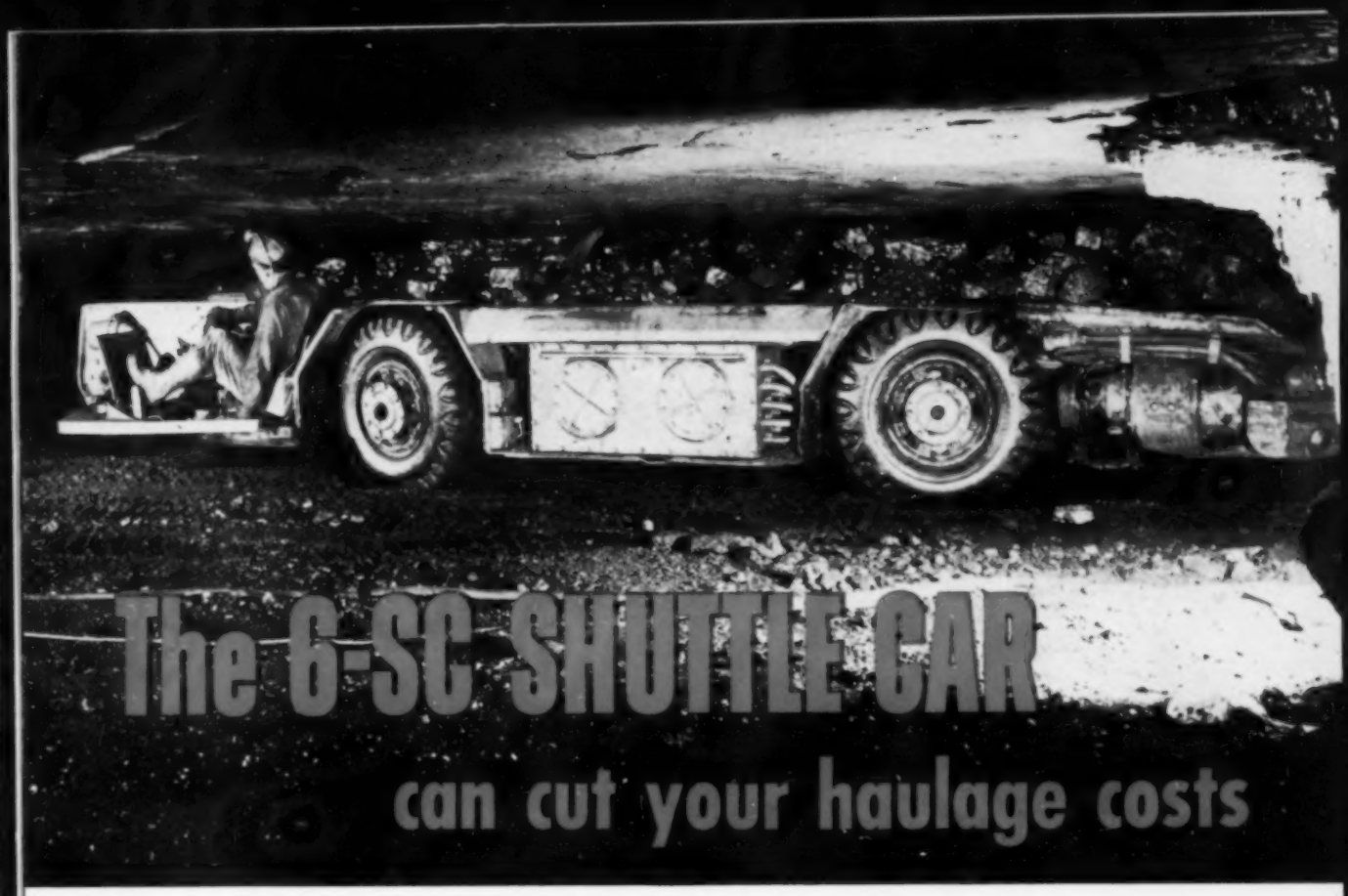
Just check the advantages they offer you: — 1,000-*hour lubrication periods* on truck wheels, idlers, support rollers . . . *all-steel, one-piece welded main frame* that offers longer tractor life . . . *A-type truck frames* pivot to permit free track oscillation . . . *double reduction final drives* with more clearance and shorter shafts that resist deflection . . . *unit construction* for quick, easy disassembly . . . *lubrication points easily accessible . . . easy operating controls.* Add 'em up, you'll know why — Allis-Chalmers tractors are your best buy.

MODEL	HP.	WT.
HD-20	175 net engine*	41,000 lb.
HD-15	109 drawbar	27,850 lb.
HD-15	135 net engine*	28,300 lb
HD-9	72 drawbar	18,800 lb.
HD-5	40 drawbar	10,500 lb.

*with hydraulic torque converter drive

Ask your Allis-Chalmers dealer to show you these tractors at work. Let him demonstrate how this modern design out-performs under actual job conditions.

ALLIS-CHALMERS
TRACTOR DIVISION • MILWAUKEE 1, U. S. A.



The 6-SC SHUTTLE CAR can cut your haulage costs

Can't beat it for speed and flexibility in medium-low coal

In its field, this newest-model Joy 6-SC Shuttle Car is the best assurance of low-cost, high-capacity haulage you can get—and here's why.

First, it's field-proved as the fastest and most dependable car in its class. The 6-SC makes time where it counts . . . in continuous operation from the face to the discharge point and back again.

Second, this year's model includes many improvements, modifications and additions that greatly increase its serviceability and all-around efficiency. Motors, gearing, wheel units, brakes and frame are all overcapacity, and it has interchangeable wheels and non-slip drive, plus such Joy-pioneered features as power steering and airplane-type disc brakes.

The Joy 6-SC has 4-wheel positive drive, 4-wheel hydraulic steering, and hydraulically adjustable elevating discharge. It is built in five heights from 29″ to 38½″ without sideboards, with a capacity range from 100 to 180 cu. ft.

● Other Joy Shuttle Cars include a type for every mining condition. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

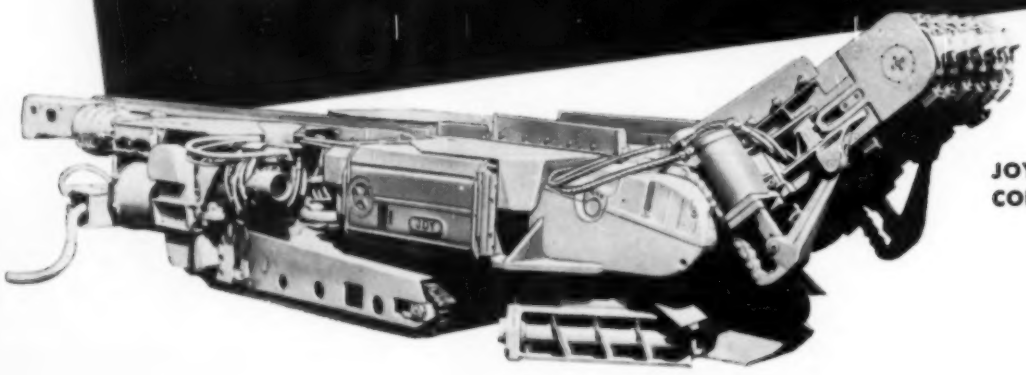
Consult a Joy Engineer

JOY

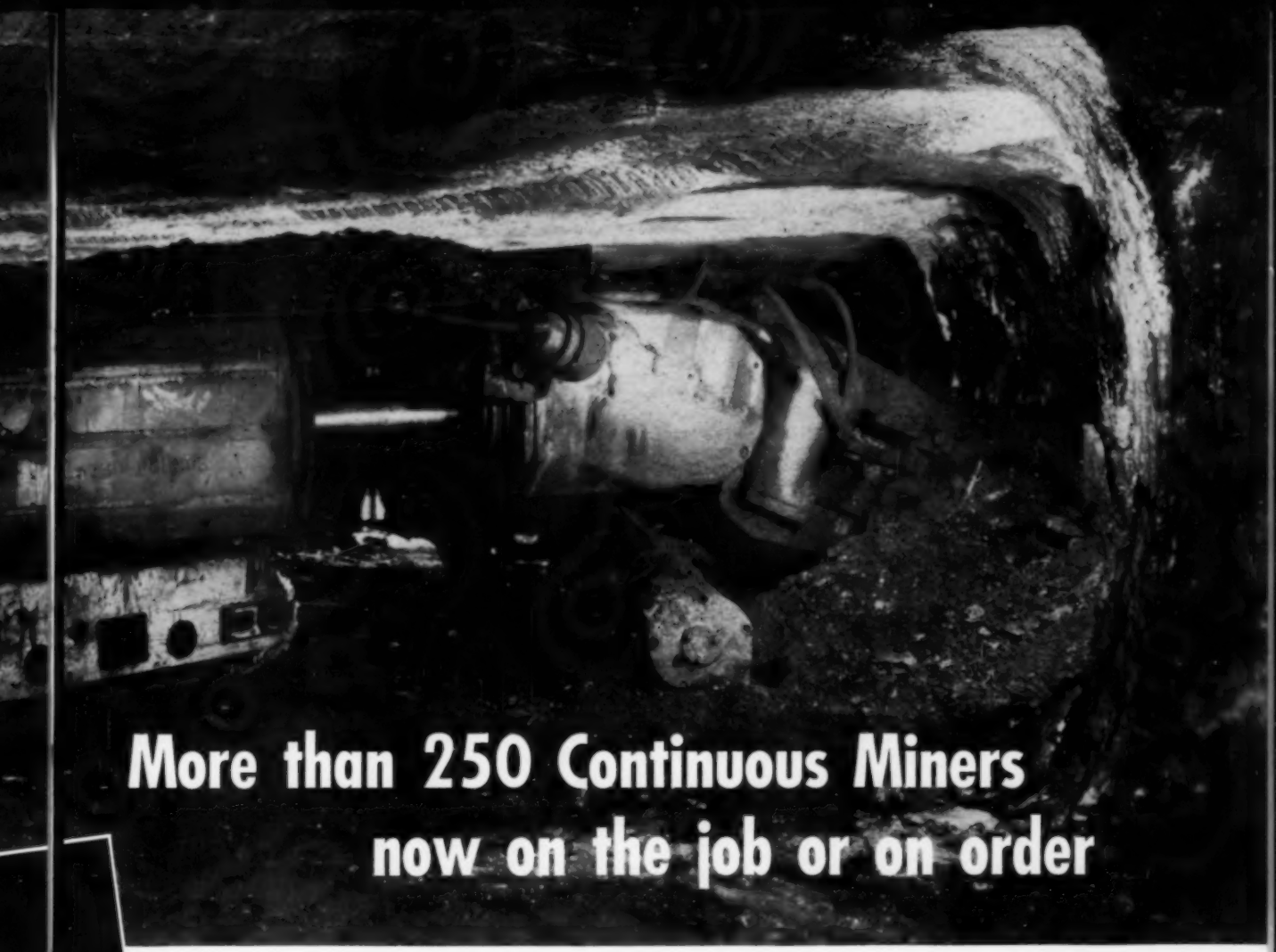
WAD CL4

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

SCORE: 10 to 1



JOY 3-JCM
CONTINUOUS MINER



More than 250 Continuous Miners now on the job or on order

If you're looking for proof of the standout performance and efficiency of Joy Continuous Miners, that comparative score of 10 to 1 is your answer!

What it means is simply this: there are approximately *10 times* as many JCM units now at work or on order as all other makes of comparable mining machines combined. That's *field-proved* superiority . . . not just a comparison on paper. What's more, it's proof from practically every coal-mining area in the world, and covers almost any mining condition you could name. You'll find JCM's in low coal, thick seams and split seams . . . developing entries, opening headings, driving up rooms and taking pillar. They go anywhere . . . do *every* job well!

Look at it this way: Joy Continuous Miners are the modern way to protect your profit margin. They're fast, tough and flexible . . . built to give you maximum total recovery and high production rates at the lowest possible cost per ton.

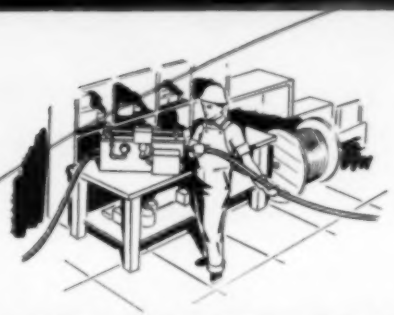
● Joy engineers are always at your service. Let us help with *your* production problems, whatever they may be. ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Penna.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

Consult a Joy Engineer

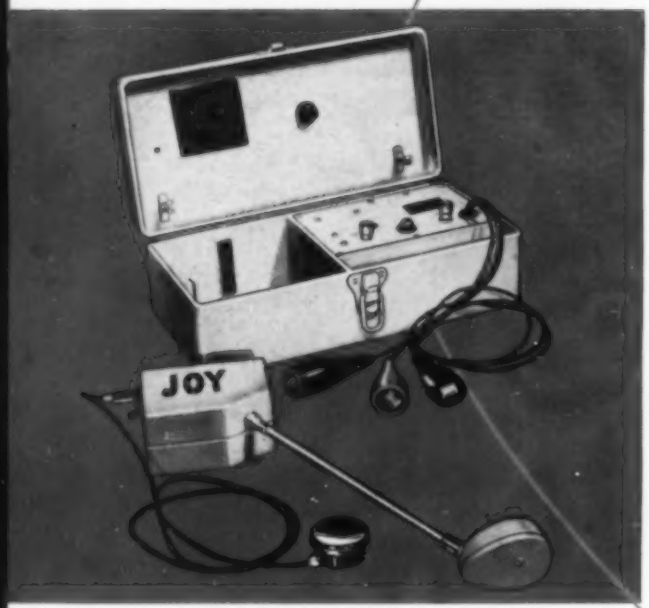
JOY

WORLD'S LARGEST MANUFACTURER OF UNDERGROUND MINING EQUIPMENT

cable maintenance



...made easy and economical



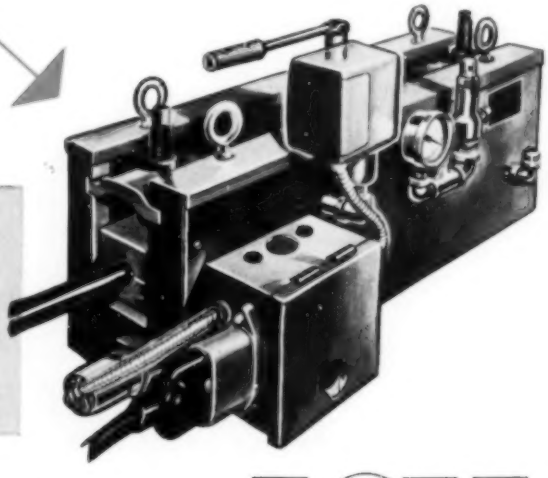
JOY cable fault finders and vulcanizers are an unbeatable combination for reducing cable maintenance costs . . . and for minimizing production "downtime" losses. Simple operating instructions are provided with each unit. You'll want to know more about this worthwhile equipment and how it will pay for itself many times over through savings its use will effect in your own cable maintenance program. Following copy briefly describes both units. Complete information is available without obligation, in the bulletins illustrated below. Ask us for copies, today.

NO. CFF-1 CABLE FAULT FINDER (left) locates opens, dead shorts or high resistance shorts *10,000 ohms or less,* in cable with Neoprene or rubber-like jacketing. Portable transmitter and receiver (A & B) are separate units that operate on standard universally available dry cells. Signal generated by the transmitter creates a magnetic or electrostatic field around cable being tested. Antenna-like receiver probe picks up this field and converts it into an audible sound in its earphone. Change in the intensity or termination of this signal accurately locates the trouble spot.

CABLE VULCANIZERS (No. 1AG illustrated at right)—Joy cable vulcanizers make it easy for anyone to repair or patch cable quickly, efficiently and professionally. Five graduated sizes, plus the wide variety of accurately machined aluminum molds now available . . . cover all standard and many special cord or cable requirements. All are heated electrically, have fully automatic controls and are supplied in a choice of popular voltages. Why take chances on cold taped splices, when it's so easy to make safe, long-lasting, professional repairs with JOY vulcanizers and vulcanizing supplies.

Vulcanizing Molds & Supplies

JOY has a complete line . . . all carefully designed and compounded to help you make professional *on-the-job* repairs, every time! Bulletin B48 describes them all, *including JOY'S flame-resistant No. 602NU compound for rejacketing and repairs.*



ASK FOR THESE BULLETINS

No. F38
Cable Fault Finder Bulletin—
Two pages of description and illustrations on JOY'S CFF-1 cable fault finder.

No. B48
Cable Vulcanizer Bulletin—
Sixteen two-color pages crammed full of usable information on JOY vulcanizers, molds and supplies.

Consult a Joy Engineer

JOY

W&D CO 5109

JOY MANUFACTURING COMPANY
Henry W. Oliver Building, Pittsburgh 22, Pennsylvania
In Canada:
Joy Manufacturing Co. (Canada) Ltd., Galt, Ontario

GM DIESEL
CASE HISTORY NO. 537-42

USER: C. H. Snyder
Coal Company,
Cowansville, Pa.

INSTALLATION: GM "6-71"
2-cycle Diesel replaced
4-cycle Diesel in shovel
over 2 years ago.

PERFORMANCE: Owner
C. H. Snyder reports
better performance,
25% more production
with GM Diesel power.
GM Diesel starts faster,
uses less lube oil, gives
smoother operation.

It Pays to Standardize on

. . . available in more than 750 models of equipment built by over 150 manufacturers

GM
GENERAL MOTORS
DIESEL
POWER

Production up 25% with

GM DIESEL POWER

When his shovel was two years old, owner C. H. Snyder switched to General Motors Diesel power and upped production from 8,000 to 10,000 tons of coal per month. He converted to GM Diesel because these 2-cycle Diesel engines have given him dependable low-cost performance in a tractor, dragline, truck and another shovel.

Fast-accelerating, smooth-running GM Diesels do more work at less cost in new equipment or old. They start at the push of a button even in coldest weather—deliver power at every piston downstroke to speed operations, boost production. Low-cost parts are readily available and GM Diesel distributors back up GM Diesel performance with on-the-spot service. Call your distributor today—ask him about low-cost horsepower for *your* job.

DETROIT DIESEL ENGINE DIVISION
GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines . . . 16 to 275 H.P. Multiple Units . . . Up to 840 H.P.

A house for tomorrow

When Bill Miller first talked to the architect about his new home he stressed his desire to put into it the soundest materials and the newest conveniences.

"I hope my grandchildren will be happy in this house," he explained. "New improvements come fast these days, so let's try to be a few years ahead in our planning."

"What fuel would you like to use?" asked the architect when the discussion reached the heating plant.

"I would prefer to use coal," answered Bill, "I understand it is the most economical fuel here, as it is in most areas. But I don't want my wife to be a furnace-tender."

"With a modern, bin-feed stoker with thermostatic control," said the architect, "your heating will be completely automatic, as well as clean and convenient. And coal has some big advantages – it gives a steady heat, not an off-again-on-again heat. Then there's this for the fellow who looks ahead: I don't know how long these other fuels are going to last. Every year they have to drill their wells deeper, and we are becoming more and more dependent on foreign supplies. As these other fuels get scarcer, they are going to get even more expensive.

"But coal is another story. There is plenty of coal right here in the United States to last us for hundreds—maybe thousands of years. That's something to think about when you're planning a house with the hope that your grandchildren will still be living in it."

COAL
FUEL OF THE FUTURE

Chesapeake and Ohio Railway

Bring your fuel problems to C & O

As the world's largest carrier of bituminous coal, the C&O is intimately familiar with every phase of coal use. We have a large staff of experts who will gladly help you to locate the coal best suited to your needs; to help you use it most efficiently; to help get it to you promptly.

Write to:

Coal Traffic Department
Chesapeake and Ohio Railway
2119 Terminal Tower
Cleveland 1, Ohio

Goodyear Quality Pays Off Again:

Coal-Flo—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

THEY DOWNGRADED COSTS TWO WAYS

with this 3-stage, power-generating conveyor

HAULING coal from pit to tipple was a serious problem at this Rocky Mountain mine. Six miles of treacherous, mountain-shelf road made costs and hazards high. Particularly since temperatures ran as low as 40 below and annual snowfall as high as 150 inches.

Solution came with the help of the G.T.M.—Goodyear Technical Man—in the form of a half-mile system of conveyors. Three 42″-wide belts quickly and safely carry the coal down grades averaging 27% at the rate of 250 tons per hour. Over 750,000 tons have been hauled in four years with virtually no maintenance.

And induction gear-motors at the tail pulleys convert the energy, created by lowering the coal some 700 vertical feet, into electric power to run the dragline and other equipment. A double savings!

See the G.T.M. for similar help with your haulage problems. Contact him through your Goodyear Distributor or by writing Goodyear, Industrial Products Division, Akron 16, Ohio.

YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing or Rolls. Look for him in the Yellow Pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

GOODYEAR

THE GREATEST NAME IN RUBBER

We think you'll like "THE GREATEST STORY EVER TOLD"—every Sunday—ABC Radio Network—THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network

This DATA may solve YOUR piping problem

● Here is the up-to-date story of Yoloy Continuous Weld Pipe—a remarkable low alloy steel whose nickel-copper content gives it unique ability to withstand corrosion, abrasion and shock. These outstanding advantages combined with high strength, ductility and weldability make Yoloy Pipe an excellent selection.

Proved by 18 years of satisfactory performance, Yoloy is highly recommended by users in such service as radiant heating, snow melting, gas line gathering, brine lines and other industrial piping.

This new folder presents the facts and figures on Yoloy's physical and chemical properties, with data on sizes now available and other information you'll need to select Yoloy Continuous Weld Pipe to meet your special requirements. Write for a copy today.

Youngstown

QUALITY
YOUNGSTOWN
SERVICE

THE YOUNGSTOWN SHEET AND TUBE COMPANY

Manufacturers of Carbon, Alloy and Yoloy Steel

General Offices — Youngstown 1, Ohio

Export Office - 500 Fifth Avenue, New York

COLD FINISHED CARBON AND ALLOY BARS · ELECTROLYTIC TIN PLATE · COKE TIN PLATE · WIRE · PIPE AND TUBULAR PRODUCTS · CONDUIT · RODS · SHEETS · PLATES · BARS · RAILROAD TRACK SPIKES.

Welding is easy with flexible TIREX

Welding for hours on end puts a terrific "drag" on the operator's wrist. When his wrist tires, his work slows down and so do your profits. With present material prices and labor costs, it's good business to keep production high.

This requires the right welding cable. Welding cables must have characteristics not found in other portable cables. They must be unusually flexible; they must be safe; they must strip clean.

Simplex-TIREX Welding Cable meets all of these requirements. Thousands of hair-fine, closely stranded copper wires permit extreme flexibility. A paper separator over the conductor allows clean stripping and supports the strands.

The Selenium Neoprene Armor provides outstanding resistance to abrasion, acids, flame, grease, moisture, and oil. It is not easily cut, and provides insulation with essential electrical stability.

To get more for your money by decreasing "drag" and increasing welding efficiency, buy Simplex-TIREX Welding Cable. For long life, all Simplex-TIREX Cords and Cables are cured in lead. To keep your production and profits at a high level, specify and be sure you get Simplex-TIREX Welding Cable. Your nearest Simplex distributor probably has this tough, flexible welding cable in stock.

Simplex WIRES & CABLES

TIREX CORDS AND CABLES *are made only by the*

SIMPLEX WIRE & CABLE CO., 79 Sidney St., Cambridge 39, Mass.

where
STEADY
OUTPUT
COUNTS MOST

you can count on
BUCYRUS-
ERIES

WHEN he's at the controls of a Bucyrus-Erie, like the 38-B shown here, a shovel operator quickly becomes an expert at keeping trucks loaded and on the move. That's because it's so easy to set a fast steady pace, so easy to keep it up all through the shift — and to repeat the process day after day, month after month.

Behind this steady dependable performance is Bucyrus-Erie *individual design*. Like every other model in the line, the 38-B is an entirely separate unit, engineered from the ground up for its particular work range. It has just the right combination of speed, power, strength and weight for big output and economical operation. As a result, you get a smooth fast work cycle, low operating costs, low maintenance, and the dependability that always keeps your coal on the move to the tipple.

Ask your nearby Bucyrus-Erie distributor for complete details on how Bucyrus-Erie *individual design* can speed up your operations. For information on large excavators for loading and stripping, write us direct. 41E53

BUCYRUS
ERIE

¾- to 4-yd. Diesel, Gasoline or
Single-Motor Electric
Convertible Excavators

BUCYRUS-ERIE CO. • South Milwaukee, Wisconsin

ANOTHER

FAIRMONT PREPARATION PLANT

Fairmont-built plant processing 210 TPH of 7" x ⅛" No. 4 Pocahontas coal for the Gulf Smokeless Coal Co. at Tams, W. Va.

Something Extra

...for tough cleaning jobs

Where a high reject rate and percentage of near gravity material presents a cleaning problem, the competitive market demands an efficient cleaning process.

Fairmont-built Preparation Plants meet those market demands through coordinated responsibility in design, engineering, fabrication and erection . . . coordinated responsibility which results in specifying the proper equipment to do the job and "something extra" toward greater operating economy and production efficiency.

When you have a cleaning problem, let Fairmont assume the full responsibility of providing or modernizing a plant that guarantees product uniformity and over 99% separating efficiency through a wide size range in any tonnage capacity. Call a Fairmont Engineer.

FAIRMONT MACHINERY COMPANY

FAIRMONT, WEST VIRGINIA

DESIGNERS AND CONSTRUCTORS OF COMPLETE COAL PREPARATION PLANTS USING BOTH WET AND DRY CLEANING, CENTRIFUGAL AND THERMAL DRYING.

New Chevrolet Trucks

deliver hour-saving power that saves you money, too!

New Chevrolet trucks bring you great new engine power in every model—from light-duty pickups to heavy-duty tractors. And this new power means important savings of both time and money on the job!

YOU SAVE TIME WITH GREATER SAFETY

That's because new Chevrolet trucks permit you to maintain faster schedules *without* driving at higher maximum road speeds. Thanks to greatly increased acceleration and hill-climbing ability, you can save time where it counts. Instead of trying to make up for lost time, you actually cut down the time lost at traffic lights and on steep grades.

YOU SAVE PLENTY ON OPERATING COSTS

New Chevrolet trucks bring you high-compression power that saves you money every mile. All three great engines—the "Thriftmaster 235," the "Loadmaster 235" and the "Jobmaster 261"* deliver greater horsepower *plus* increased operating economy. In addition, the mighty "Jobmaster 261" engine reduces the need for operating in low gears on heavy-duty jobs. As a result, you shift gears less . . . save more on gas.

Now's a good time to see your Chevrolet dealer about a time-saving, money-saving truck. . . . Chevrolet Division of General Motors, Detroit 2, Michigan.

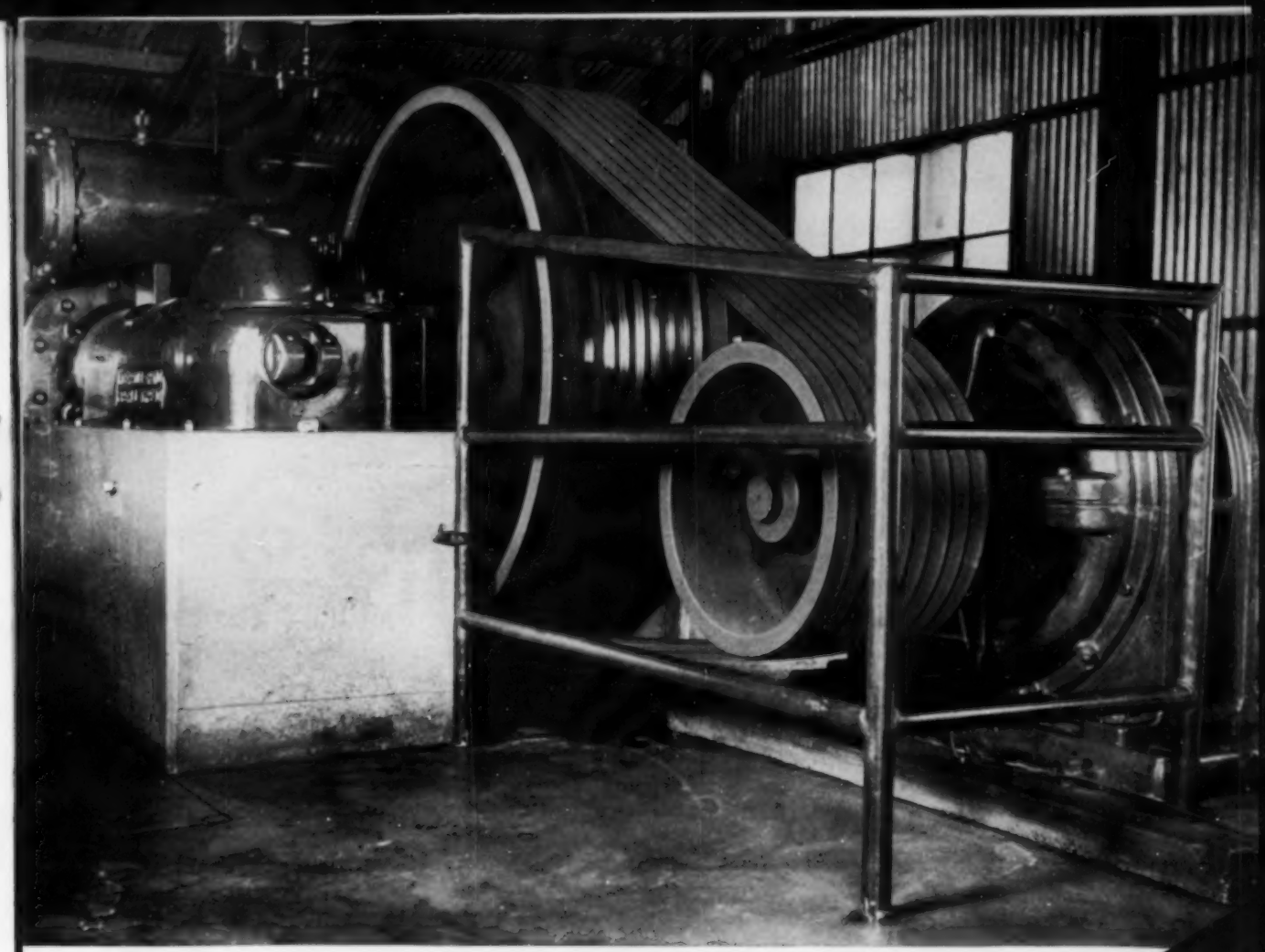
CHEVROLET

MOST TRUSTWORTHY TRUCKS ON ANY JOB!

CHEVROLET ADVANCE-DESIGN TRUCK FEATURES

THREE GREAT ENGINES—The new "Jobmaster 261" engine* for extra heavy hauling. The "Thriftmaster 235" or "Loadmaster 235" for light-, medium- and heavy-duty hauling. **NEW TRUCK HYDRA-MATIC TRANSMISSION***—offered on ½-, ¾- and 1-ton models. Heavy-Duty **SYNCHRO-MESH TRANSMISSION**—for fast, smooth shifting. **DIAPHRAGM SPRING CLUTCH**—improved-action engagement. **HYPOID REAR AXLE**—for longer life on all models. **TORQUE-ACTION BRAKES**—on all wheels on light- and medium-duty models. **TWIN-ACTION REAR WHEEL BRAKES**—on heavy-duty models. **DUAL-SHOE PARKING BRAKE**—greater holding ability on heavy-duty models. **NEW RIDE CONTROL SEAT***—eliminates backrubbing. **NEW, LARGER UNIT-DESIGNED PICKUP AND PLATFORM STAKE BODIES**—give increased load space. **COMFORTMASTER CAB**—offers greater comfort, convenience and safety. **PANORAMIC WINDSHIELD**—for increased driver vision. **WIDE-BASE WHEELS**—for increased tire mileage. **BALL-GEAR STEERING**—easier, safer handling. **ADVANCE-DESIGN STYLING**—rugged, handsome appearance.

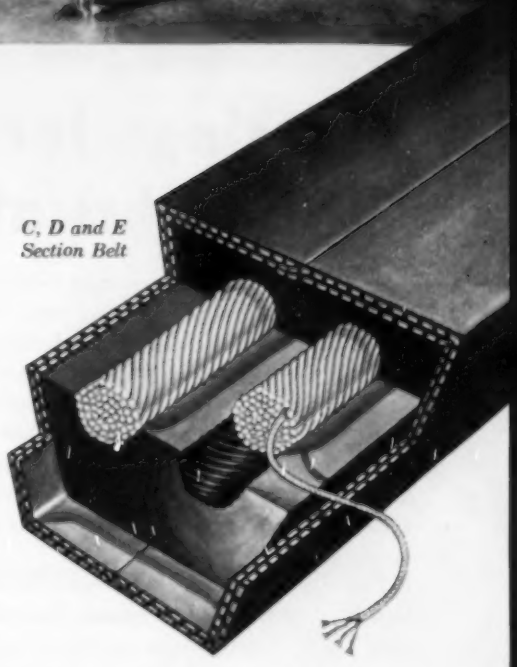
**Optional at extra cost. Ride Control Seat is available on all cab models, "Jobmaster 261" engine on 2-ton models, truck Hydra-Matic transmission on ½-, ¾- and 1-ton models.*



Thermoid Multi-V Belts cut operating costs

There's a Thermoid V-Belt for every mining application. Every belt is *pre-stretched* to provide longer service and maximum power transmission without slippage. Thermoid C, D and E sections are rayon-grommeted for brute strength and extra flexibility that withstands repeated shock loads. The entire belt is vulcanized into a solid unit that resists moisture, abrasion, internal friction and heat.

Get longer wear with less maintenance . . . cut your operating costs with Thermoid Multi-V Belts. Call your Thermoid Distributor or write direct for Catalog #3787.



C, D and E Section Belt

Conveyor & Elevator Belting • Transmission Belting
F.H.P. & Multiple V-Belts • Wrapped & Molded Hose

Thermoid

Rubber Sheet Packings • Molded Products
Industrial Brake Linings and Friction Materials

Thermoid Company • Offices & Factories: Trenton, N. J., Nephi, Utah

Crossings for rail 60 lbs and heavier prefabricated to fit your layout

Here is a husky Bethlehem crossing designed to carry the tonnage tomorrow as well as today. Its owners recognized the need for stand-up-and-take-it track that can handle the increasingly heavy loads of modern mine haulage.

As part of its complete prefabricated track service, Bethlehem can furnish heavy-duty crossings like this one, using 60-lb rail or heavier, to suit the needs of your layout. We'll design and build them for any track gage, to any degree of angle, prefabricated at our plant to make a slick fit at your mine.

You can specify your Bethlehem crossings in either bolted-rail or bolted-plate designs. Two-rail or three-rail type. The third rail, besides adding strength to the crossing, acts as an "easer" for false flanges on worn wheels.

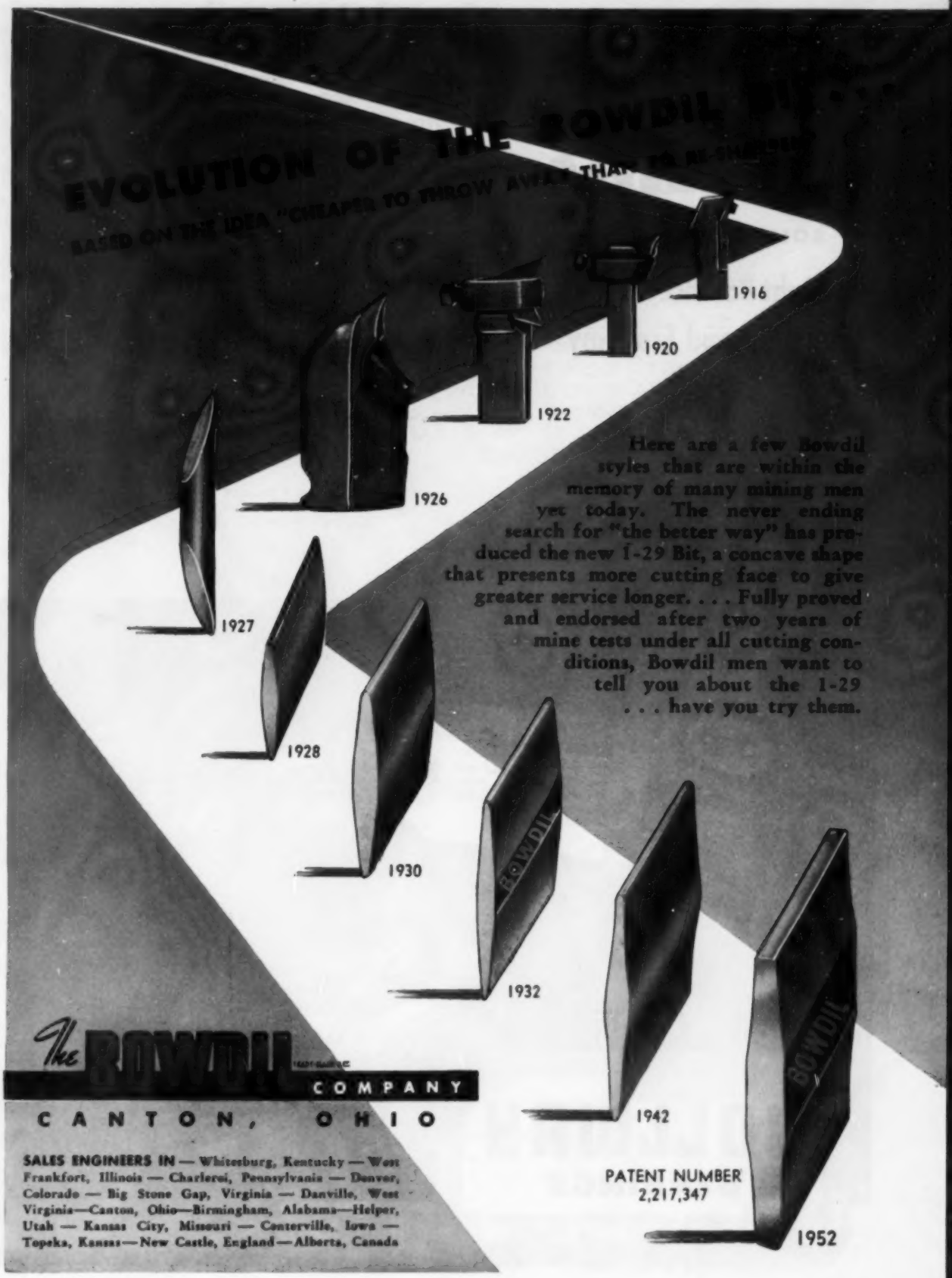
If you are thinking of changing your layout, or perhaps opening a new mine, you'll find it profitable to consult with a Bethlehem engineer. With his years of experience in mine haulage problems, he is well equipped to help you and your staff plan a system that will meet your requirements for years to come. If you would like him to, he'll take the whole load right off your shoulders, down to the last spike and tie-plate. A phone call or note addressed to the nearest Bethlehem office will start him moving.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM PREFABRICATED TRACK


EVOLUTION OF THE BOWDIL BIT
BASED ON THE IDEA "CHEAPER TO THROW AWAY THAN TO RE-SHARPEN"
1916
1920
1922
1926
1927
1928
1930
1932
1942
1952
BOWDIL
BOWDIL
Here are a few Bowdil styles that are within the memory of many mining men yet today. The never ending search for "the better way" has produced the new 1-29 Bit, a concave shape that presents more cutting face to give greater service longer. . . . Fully proved and endorsed after two years of mine tests under all cutting conditions, Bowdil men want to tell you about the 1-29 . . . have you try them.
The BOWDIL COMPANY
CANTON, OHIO
SALES ENGINEERS IN — Whitesburg, Kentucky — West Frankfort, Illinois — Charleroi, Pennsylvania — Denver, Colorado — Big Stone Gap, Virginia — Danville, West Virginia—Canton, Ohio—Birmingham, Alabama—Helper, Utah — Kansas City, Missouri — Centerville, Iowa — Topeka, Kansas—New Castle, England—Alberta, Canada
PATENT NUMBER 2,217,347

ROLLWAY

Tru-Rol

ROLLER BEARINGS

The Right Balance Between Precision and Economy

Rollway's Tru-Rol Cylindrical Roller Bearings fill a well-defined need . . . afford the design engineer much wider latitude in balancing performance and reasonable cost.

A steel-cage bearing in the steel-cage cost range, Tru-Rol boasts true and precise rolling approaching that of bronze-separator types. That's because of the exclusive Rollway guide-lip . . . an ingenious, low-cost feature that prevents roller-skewing, sliding friction and excessive wear. Investigate Tru-Rol's outstanding record before you specify bearings in the medium price range.

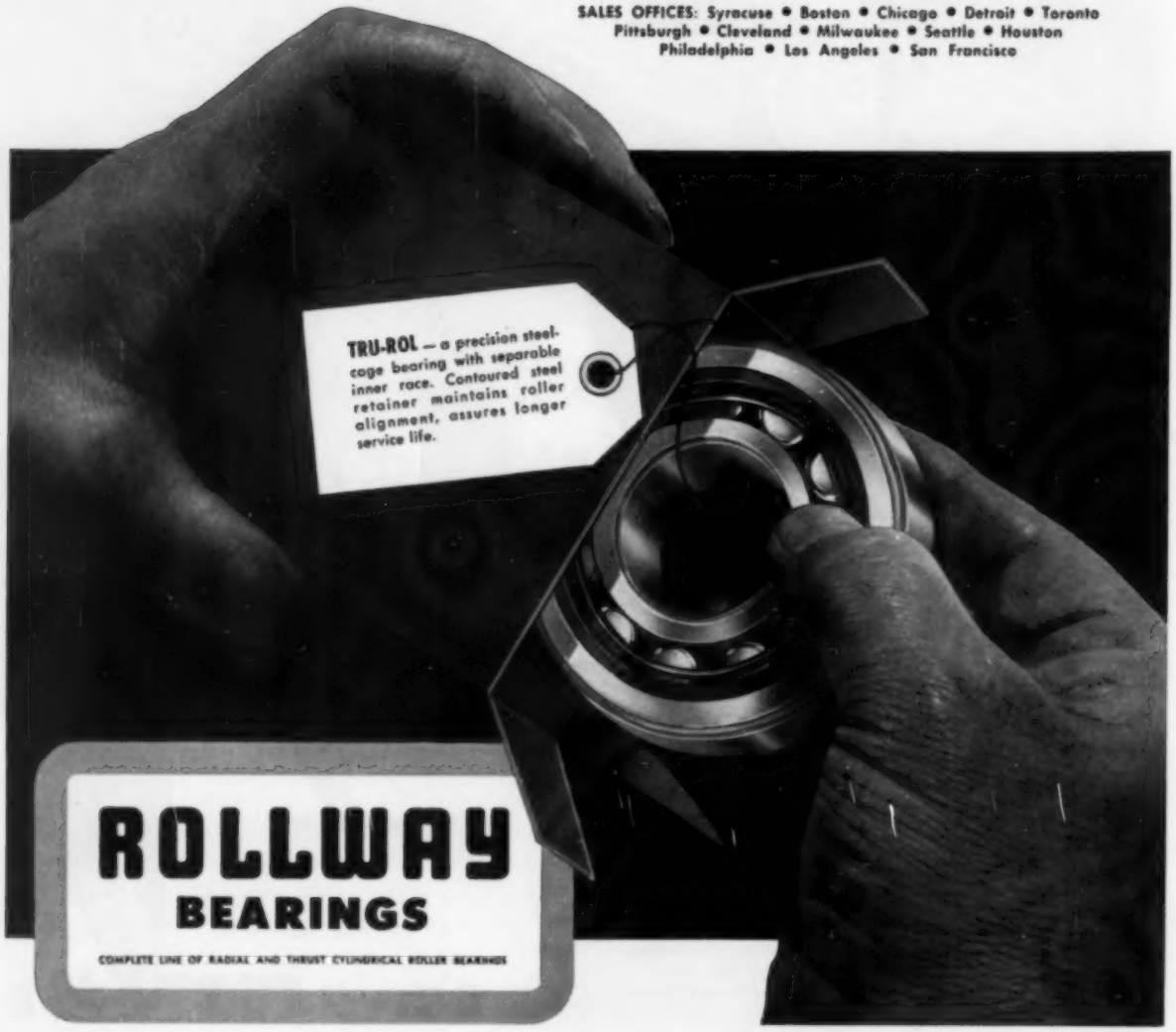
Our complete engineering and metallurgical services will gladly work with you on your problem. Simply write or wire any sales office. No cost. No obligation.

Rollway Bearing replacements are available through authorized distributors in principal cities. Consult your classified phone directory.

ROLLWAY BEARING CO., INC.

SYRACUSE, N. Y.

SALES OFFICES: Syracuse • Boston • Chicago • Detroit • Toronto
Pittsburgh • Cleveland • Milwaukee • Seattle • Houston
Philadelphia • Los Angeles • San Francisco


TRU-ROL — a precision steel-cage bearing with separable inner race. Contoured steel retainer maintains roller alignment, assures longer service life.
ROLLWAY
BEARINGS
COMPLETE LINE OF RADIAL AND THRUST CYLINDRICAL ROLLER BEARINGS

READILY ACCESSIBLE FOR SERVICE

- ALL MAINTENANCE POINTS ARE EASY TO REACH.
- CAN BE TAKEN DOWN AND RETURNED TO SERVICE IN LESS THAN A HALF HOUR.
- MANY PARTS INTERCHANGEABLE BETWEEN DIFFERENT PUMP SIZES.

ALLIS-CHALMERS

Coal Washing PUMP

Here's How Easy Service Is

Disconnect drive, loosen casing bolts and lift bolt assembly from slots. Bolt, nut and washers are still connected for easy reassembly.

Swing out rotating element. Neither suction or discharge piping is disturbed. All wearing parts are fully accessible for inspection or service.

FOR HELP ON YOUR COAL WASHING PROBLEMS, call your nearest Allis-Chalmers District Office. For more information, write Allis-Chalmers, Milwaukee 1, Wisconsin for Bulletin 52B6381.

A-C ALLIS-CHALMERS

A-4224

ALLIS-CHALMERS

WHERE EXPLOSIVES RESEARCH PAYS OFF

About 487,000,000 tons of coal were mined last year to provide fuel for America's electric utilities, coke ovens for producing steel and cement, and railroads. Mining that tonnage economically and efficiently required nearly a quarter billion pounds of industrial explosives.

Illustrated is one example of how explosives research pays off. The proper use of the right type of permissible explosive brought down a high percentage of lump, ready to be used with a minimum of processing.

Such results come from Hercules' continuous explosives research and extensive knowledge of field conditions. These are important factors in the economical and efficient blasting of coal, metals and nonmetallics, quarrying, and construction. Our technical representatives welcome the opportunity to consult with you on blasting problems.

HERCULES POWDER COMPANY
INCORPORATED

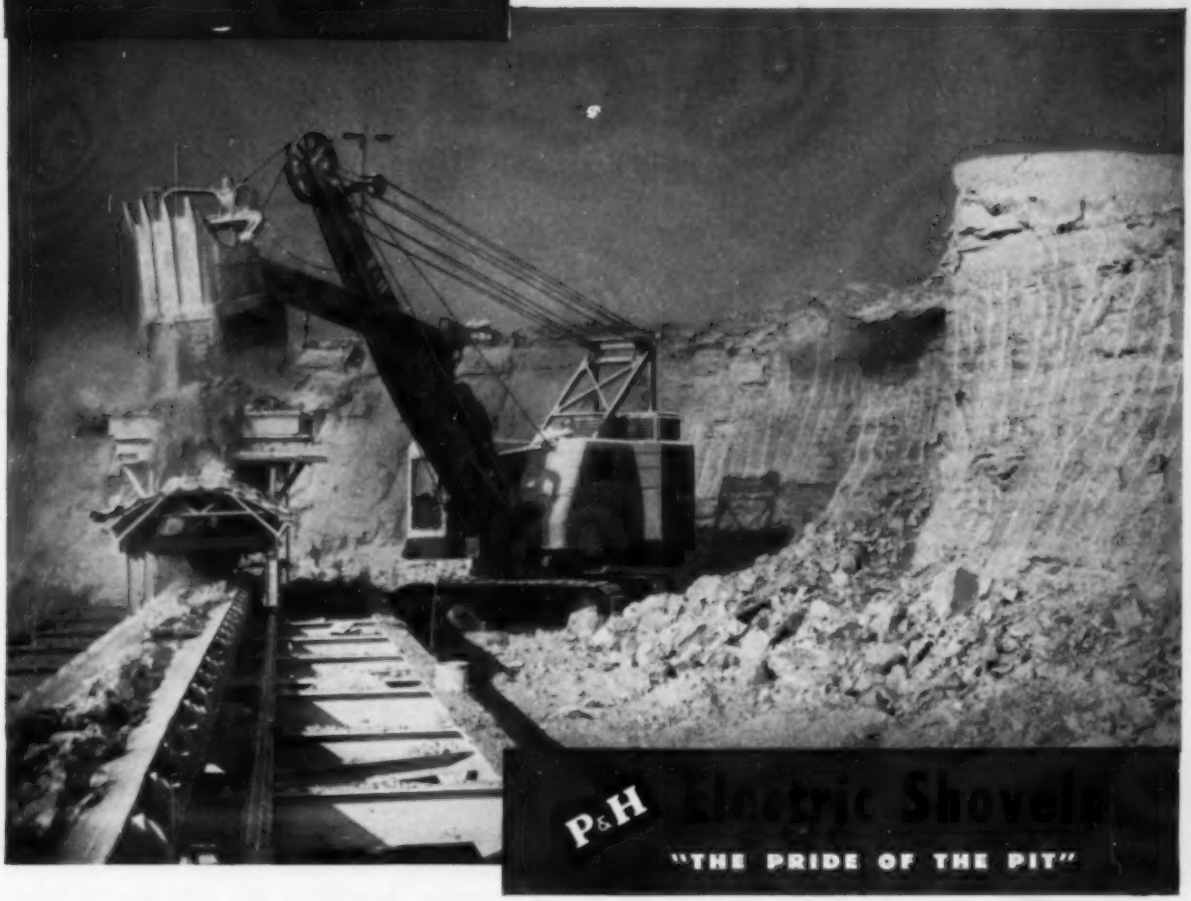
Explosives Department, 936 King St., Wilmington 99, Del.

Birmingham, Ala.; Chicago, Ill.; Duluth, Minn.; Hazleton, Pa.; Joplin, Mo.; Los Angeles, Cal.; New York, N. Y.; Pittsburgh, Pa.; Salt Lake City, Utah; San Francisco, Cal.

X854-2

SULPHUR

500 long tons an hour!



Here at the Freeport Sulphur Company in Louisiana, three P&H 3½-yd. Electric Shovels work an average of 18 hours a day to handle the entire output of the Grande Escaille Mine. 500 tons of sulphur are loaded every hour by each of the three P&H 3½-yd. shovels.

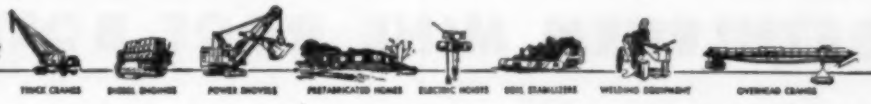
Why does Freeport go P&H? One big reason is that only P&H Magnetorque* eliminates both friction clutches and DC commutators . . . big maintenance headaches anywhere, especially where corrosive atmospheres exist. And, electrical equipment is designed throughout for shovel service — *not adapted for it.* That's another important factor that means lower tonnage costs in any kind of open pit work.

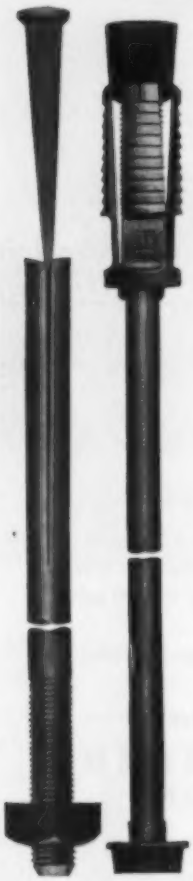
We have many interesting facts about low-cost production in your type of work . . . facts that will explain why every third P&H Electric Shovel sold is a repeat order. Write us.

*T.M. of Harnischfeger Corporation for electro-magnetic type coupling.

P&H LARGE EXCAVATOR DIVISION
HARNISCHFEGER CORPORATION
MILWAUKEE 46, WISCONSIN

the P&H *Line*





Roof Bolts? Wouldn't be without 'em!

"Sure, I was kind of cool toward roof bolts at first. After all, I've worked in this mine for years, and was used to other types of roof supports. But now that I've had time to watch roof bolts in use, and realize how they reduce the accident rate, and increase production, too—well, I just wouldn't be without 'em!"

• • • • •

Roof bolts improve safety and increase production. In addition, they make possible better ventilation, greater clearances, wider mine openings and faster haulage. And they eliminate the need for space-consuming supports.

Bethlehem makes the two types of roof bolts shown here. Each is available in various lengths, and can be installed vertically or at an angle. Like full information? Write to us at Bethlehem, Pa.

SLOTTED ROOF BOLT—A 1-in. bolt, for use in 1¼-in. hole. Has centered, forged slot, 6 in. long, which receives steel wedge. No metal is removed by slotting. Opposite end of bolt has 5 in. of rolled threads. When bolt is driven, the wedge is forced into slot, expanding bolt-end. Truncated-cone point prevents thread damage. Fitted with American Standard Regular Square Nut.

SQUARE HEAD ROOF BOLT—A ¾-in. bolt, for use in 1⅛-in. hole. Furnished with expansion shell. Bolt has rolled threads, unchamfered head. Pressed ears on shank support shell during anchoring. When bolt is tightened, shell expands, locks against sides of hole.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM MINE ROOF BOLTS

BETHLEHEM STEEL

Photograph by Howard Lucas

For Moving Mountains...or Digging Coal...

Standardize on AMERICAN Explosives and Accessories

Wherever the stroke of the detonator sets the earth shaking, American blasting materials help speed the work.

Experienced shooters everywhere rely on American explosives because they know they're dependable—that they're produced by modern methods and under strict laboratory control to give the results that shooters want. Available in a wide range of densities, velocities and strengths, American explosives are designed to do your job best—because constant field research tells us what you need. Capable field engineers are available at your call.

HIGH EXPLOSIVES • PERMISSIBLES • BLASTING POWDER • BLASTING ACCESSORIES

AMERICAN Cyanamid COMPANY

EXPLOSIVES DEPARTMENT

30 Rockefeller Plaza, New York 20, N. Y.

Sales Offices: Pittsburgh, Pa., Bluefield, W. Va., Scranton, Pa., Chicago, Ill., Pottsville, Pa., Maynard, Mass.

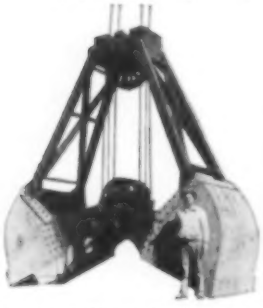
Wellman will build it

Special Cranes
Ore Bridges
Gas Producer Plants
Charging Machines
Forging Manipulators
Car Dumpers
Gas Flue Systems
Gas Reversing Valves
Coke Pushers
Mine Hoists
Skip Hoists
Clamshell Buckets

Wellman ore and coal handling bridges

give fast and efficient operation

One of two 6-ton Coal Handling Bridges in this installation.



6-ton Wellman Williams Type Coal Bucket used with these bridges.

● Take advantage of Wellman's long experience in designing and building handling bridges of many types and capacities. Your selection from the complete line will provide fast and efficient handling of coal or ore. Wellman equipment, in service the world over, is recognized for its long life and dependable service. It is backed by more than half a century of engineering experience.

THE WELLMAN ENGINEERING COMPANY

7012 CENTRAL AVENUE • CLEVELAND 4, OHIO

You?...

a Doubting Thomas?

IF YOU'RE a man who has to be shown, we're right in your corner. Just give Roebling "Blue Center" Steel Wire Rope one try... see for yourself how it saves time and costs you less on the job.

Two out of three wire rope users in the mining field prefer Roebling rope. Call your nearest Roebling office for a Field Man to suggest the best rope for your purposes.

ROEBLING

A subsidiary of The Colorado Fuel and Iron Corporation

JOHN A. ROEBLING'S SONS CORPORATION, TRENTON 2, N. J. BRANCHES: ATLANTA, 934 AVON AVE. • BOSTON, 51 SLEEPER ST. • CHICAGO, 5525 W. ROOSEVELT RD. • CINCINNATI, 2253 FREDONIA AVE. • CLEVELAND, 13235 LAKEWOOD HEIGHTS BLVD. • DENVER, 4501 JACKSON ST. • DETROIT, 915 FISHER BLDG. • HOUSTON, 6216 NAVIGATION BLVD. • LOS ANGELES, 5340 E. HARBOR ST. • NEW YORK, 19 RECTOR ST. • ODESSA, TEXAS, 1920 E. 2ND ST. • PHILADELPHIA, 230 VINE ST. • SAN FRANCISCO, 1740 17TH ST. • SEATTLE, 900 1ST AVE. S. • TULSA, 321 N. CHEYENNE ST. • EXPORT SALES OFFICE TRENTON 2, N. J.

V & C Coal Corporation finds that **4,000-foot belt reinforced with "Cordura" gives trouble-free service in 8-hour-per-day operation**

View of loading point inside mine. The main belt, reinforced with Du Pont "Cordura", is loaded by feeder belts from the different cross entries where the coal is dug. It operates under low-ceiling conditions . . . with considerable dust or dampness.

The entire production of the V&C Coal Corporation's mine, at Grays Knob, Ky., depends on the performance of the main conveyor belt, shown above, which operates continuously for 8 hours per day. Produced by the Manhattan Rubber Division of Raybestos-Manhattan and sinewed for strength with Du Pont Cordura* High Tenacity Rayon, this belt has been steadily extended to reach new working areas . . . now is 4,000 feet between centers. The mine operators report that they have never had any trouble with it . . . though the belt it replaced had broken down at times while operating on 2,800-foot centers.

The high strength of Du Pont "Cordura" makes possible belting that's stronger, yet thinner, for better troughing and training. And the low stretch of "Cordura" saves costly shutdowns for take-up and resplicing.

Before you order your next conveyor belt, inquire about the use of "Cordura" rayon in belts. We'll send you the names of suppliers . . . together with full information. Just write for your free copy of "Sinews for Industry." Address: Textile Fibers Dept., Room 2520-C, E. I. du Pont de Nemours & Co. (Inc.), Wilmington 98, Delaware.

*REG. U.S. PAT. OFF.

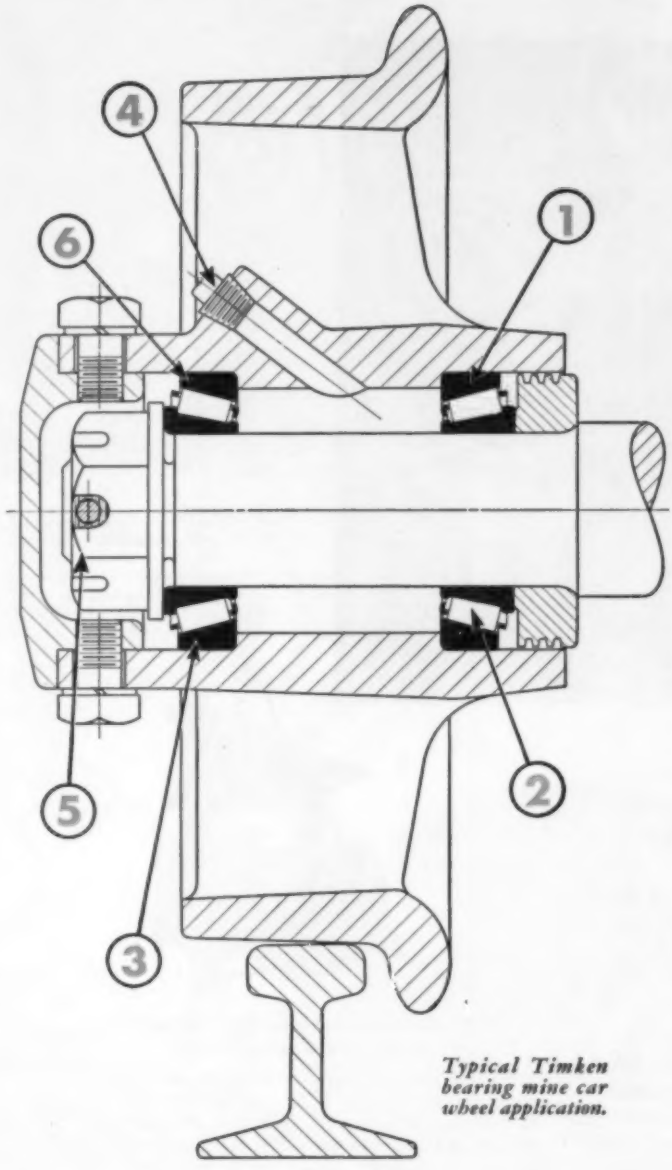
Du Pont "Cordura" High Tenacity Rayon

STRENGTH AT LOW COST

DU PONT

BETTER THINGS FOR BETTER LIVING...*THROUGH CHEMISTRY*

6 WAYS HAULAGE COSTS HAVE BEEN CUT ON OVER 500,000 MINE CARS



Typical Timken bearing mine car wheel application.

MINE operators have cut haulage costs these six ways by mounting over 500,000 mine cars on Timken® tapered roller bearings:

1. **LESS MAINTENANCE AND REPAIRS.** Timken bearings take the pounding of mine car service with minimum time out for maintenance and repairs. One reason—to find steel good enough for Timken bearings, we make our own. (Something no other bearing manufacturer does.) Rollers and races are case-hardened to give them hard, wear-resistant surfaces and tough, shock-resistant cores.

2. **GREATER LOAD CAPACITY.** Because of line contact between rollers and races, Timken bearings have extra load-carrying capacity.

3. **MORE CARS PER TRAIN.** Timken bearings let you haul more cars per train with no increase in power requirements. The true rolling motion and incredibly smooth surface finish of Timken bearings practically eliminate friction.

4. **LESS LUBRICATION.** Lubricant stays in Timken bearings—mine dirt, dust and moisture stay out. Closures are more effective because Timken bearings keep hubs and axles concentric.

5. **SIMPLIFIED INSPECTION.** Wheels can be easily removed for bearing inspection by simply pulling the cap, cotter pin and nut.

6. **NO NEED FOR SPECIAL THRUST PLATES.** The tapered construction of Timken bearings enables them to take radial and thrust loads in any combination. No special thrust plates are required. Cars take curves easier.

You can always get these cost-cutting benefits for your mine cars by always specifying Timken tapered roller bearings. The Timken Roller Bearing Company, Canton 6, Ohio. Canadian plant: St. Thomas, Ontario. Cable address: "TIMROSCO".

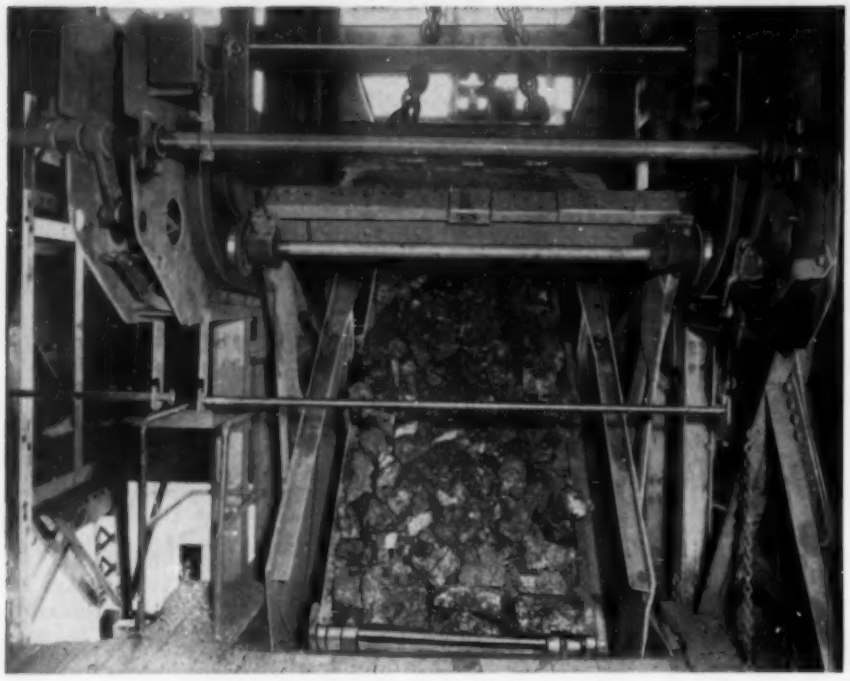
Cut your hauling costs by specifying **TIMKEN** TAPERED ROLLER BEARINGS

TRADE-MARK REG. U. S. PAT. OFF.

NOT JUST A BALL ○ NOT JUST A ROLLER ⊂⊃ THE TIMKEN TAPERED ROLLER ⊂⊃ BEARING TAKES RADIAL ⟨⟩ AND THRUST →⟨⟩← LOADS OR ANY COMBINATION →✳←

SELF DUMPING CAGES

designed and built by VULCAN of Wilkes-Barre for SPEED...SAFETY...ECONOMY



The Cage shown in operation above is one of many different types built to withstand rugged, long service with speed, safety and economy.

All mechanical parts are either high grade steel castings, steel forgings or rolled steel plates and sections, riveted and welded together to assure maximum strength per unit of weight.

No matter what your requirements may be in cages, skips or gunboats, the VULCAN IRON WORKS with more than 100 years of service to the Mining Industry is ready and able to serve you. Write for our 20 page Bulletin No. A-457 today. All types of cages, skips and gunboats are illustrated and discussed in detail.

Any information on items listed below will be sent to you immediately.

Double Roll Briquetting Machines	Scraper Loading Hoists
Open Hearth Steel Castings	Cast Steel Sheaves
Steel Plate Fabrications	All Types of Locomotives
Shaking Chute & Chain Conveyors	Rotary Kilns, Dryers, etc.
Heavy Duty Electric Hoists	Car Spotting Hoists
Self-contained Electric Hoists	Hydraulic Presses

VULCAN IRON WORKS

NEW YORK OFFICE
50 CHURCH ST., N.Y., N.Y.

WILKES-BARRE, PA., U.S.A.
ESTABLISHED 1849

CABLE ADDRESS
"VULWORKS WILKESBARRE"

Hard Coal or Soft Coal...

Leading Operators use "Eucs"

Built for tough off-the-highway service, Rear-Dump and Bottom-Dump "Eucs" are cutting the cost of hauling overburden, coal and mine waste on scores of mining operations. Big payload capacity, fast travel speed and high job availability add up to more loads per hour and lower cost per ton or yard hauled.

Your Euclid Distributor will provide a hauling production and cost estimate for your operation ... there's no cost or obligation so get in touch with him soon. Let him show you how "Eucs" can cut your coal hauling costs.

In the Pennsylvania anthracite field, Wadesville Production Company has used Rear-Dump "Eucs" of 22 to 34 ton capacity to move more than 17 million cu. yds. of overburden and nearly 2 million tons of coal since operations began in June of 1948. Performance has been so satisfactory that "Eucs" are standard hauling equipment on this big operation ... 20 units are presently in use.

Truax-Traer Coal Company has used Bottom-Dump Euclid Coal Haulers at their Illinois operation since 1935. The Euclid fleet, 14 units of 20 ton capacity and six 25 ton "Eucs", delivers an average of 8500 tons of coal to the washing plant per eight hour day. High travel speed from pit to tipple on hauls up to 3½ miles and the long service life of the Euclids help to keep hauling costs at a minimum ... every "Euc" purchased by the company is still in service!

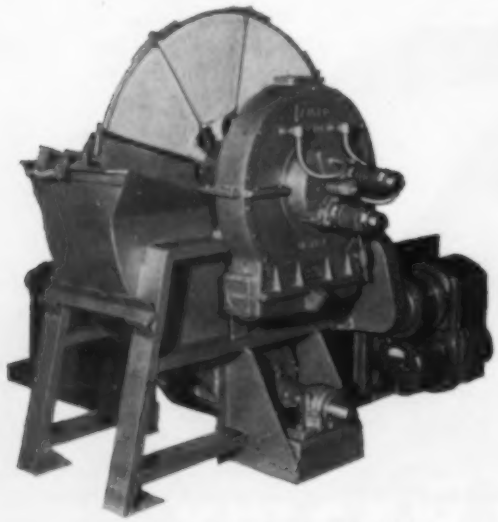
EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

GM GENERAL MOTORS

Economical Coal Fines Recovery on Eimco Agidiscs



This 22 sq. ft. Agidisc filter unit available for pilot or test work in your own plant.

Eimco Agidisc filters will dewater more coal fines per square foot of filter area per hour because:

1. **The gentle agitation keeps the fast settling particles in suspension.**
2. **Even dispersion of particles over disc surface provides uniform drying of cake.**
3. **Even cake formation prevents vacuum leaks and provides better cake drying over entire surface.**

These features mean greater savings to every operator. Filtrate from the Eimco Agidisc varies in clarity with regard to plan, location and process, but in most cases the filtrate may be returned directly to the stream and is well within the requirements of existing anti-pollution laws.

Eimco Agidisc units provide the greatest percentage of economically retrievable coals for the smallest amount of capital investment.

Write for more complete information to The Eimco Corporation, Box 300, Salt Lake City 10, Utah.

THE EIMCO CORPORATION

Export Offices: Eimco Bldg., 52 South St., New York City • Salt Lake City, Utah—U.S.A.

You Can't Beat An Eimco

"Mine problem...my problem"

says Standard lubrication specialist

● The large midwest mine whose preparation plant is pictured above is just one of the many satisfied Standard Oil mine customers throughout the Midwest. In addition to experienced Standard lubrication specialists always ready to give valuable help wherever and whenever it's needed, Standard provides the Midwest's most dependable source for quality greases and lubricants. For every mine lubrication purpose—Standard products prove superior in actual use!

In the mine pictured above, the following products have had a successful job history:

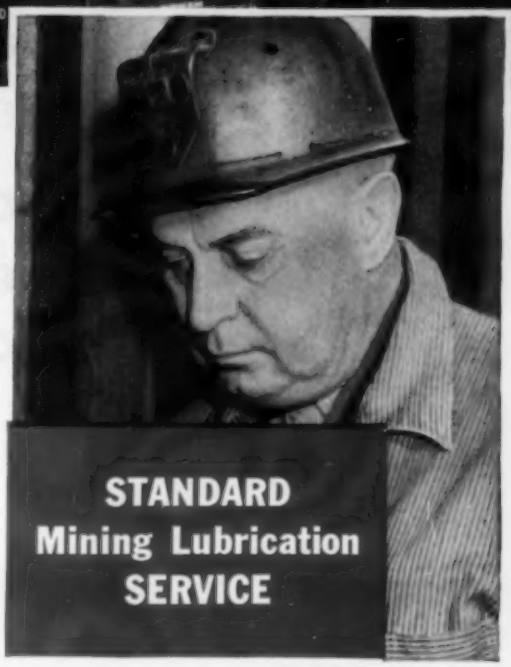
SUPERLA Mine Lubricant No. 00—used in gear cases and hydraulic units of the mine loaders. Result: no clutch or bearing failures; clean, carbon-free clutch plates; no downtime for maintenance on hydraulic units.

SUPERLA Mine Lubricant No. 4—used in the loader gathering heads. Result: despite terrific shock loads, wear has been kept to a minimum.

STANOIL Industrial Oil—used in the speed reducers in the tipple. Result: trouble-free, smooth operation keeps costly maintenance time down to a minimum.

STANOLITH Grease—used throughout the tipple on grease fittings and on conveyor belt idler bearings. Result: better protection; grease consumption reduced; grease application time cut 50%.

Why don't *you* put Standard quality and Standard versatility to work for you today?

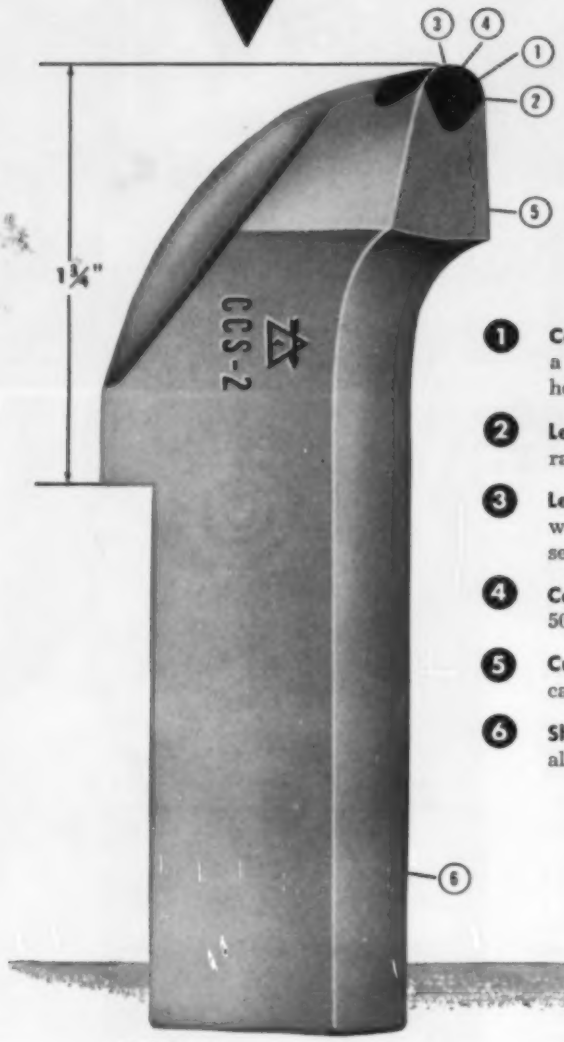


Standard Oil lubrication specialist, Herve Dillingham, helped this midwest mine with its lubrication program. The Standard Oil lubrication specialist near you can help you get good results on your lubrication problems. Call your nearest Standard Oil office. Or write, the Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

STANDARD OIL COMPANY STANDARD *(Indiana)*

CUTS FASTER
LASTS
LONGER

CARBOLOY®
CEMENTED CARBIDE



6 REASONS WHY CARBOLOY CUTTER-BIT FEATURES LOWER YOUR TOOL COST PER TON:

1. **Carbide insert stays in place** because it's held by a unique combination of braze and mechanical holding.
2. **Less power is consumed** because point has smaller radius; does a better job of cutting.
3. **Less carbide to grind** because there's less non-working top and side area. Resharpens faster, conserves carbide.
4. **Carbide has greater strength** because insert has 50% greater thickness at the cutting edge.
5. **Cuttings flow freely** because shank is level with carbide insert. "Bug dust" is minimized.
6. **Shanks resist bending** because they're heat-treated alloy steel . . . yet permit firm set screw clamping.

CCS-2
Has 1¾" stop – the size picked by the industry as most practical.

CC-2
The CC-2 has all the important features listed above. Available for those who prefer a cutter bit without a stop.

SPECIFY **CARBOLOY** MINING TOOLS
CEMENTED CARBIDE

heavy-duty cutter bits

available with or without stop

All the improved design features of the popular Carboloy CC-2 heavy-duty cutter bit are incorporated into the CCS-2 — with a practical 1¾" stop.

The high-speed efficiency and substantial operating savings which made the CC-2 first choice in the mining industry, will also be obtained with the CCS-2.

Choose the bit that's right for your operation.

Use the Carboloy CCS-2 for all cutting machines, including continuous miners. Its 1¾" stop is the industry's choice for the right combination of efficient cutting depth and minimum shank strain.

Use the Carboloy CC-2 for all cutting conditions not requiring a stop. Can be used on all machines that employ ½" and 1" bits. Set it to any gauge size. Use it on the toughest formations.

All Carboloy Mining Tools are made of the hardest metal made by man — Carboloy Cemented Carbide. They work continuously, at faster speeds, and for longer periods than steel tools. Actual mine tests prove that Carboloy Mining Tools consistently outlast steel by up to 50 times; *increase tonnage 10% to 20% per shift.*

Get maximum tonnage and efficiency from your carbide tools by using the Carboloy 3-Point Service Program. It consists of tuition-free training school for key personnel, free technical literature and free engineering field assistance. To get complete information, call your Authorized Carboloy Mining Tool Distributor. Or, send coupon, below.

IMMEDIATE LOCAL DELIVERY

Twenty Authorized Carboloy Mining Tool Distributors, strategically located across the nation's mining areas, will give you fast delivery on all orders. They maintain complete stocks of Cutter Bits, Finger Bits, Auger Drills, Roof-Bolting Drills and Masonry Drills. Their men are specially trained in carbide-tool use and maintenance techniques.

AUTHORIZED CARBOLOY CEMENTED CARBIDE MINING TOOL DISTRIBUTORS

"Carboloy" is the trademark for products of the Carboloy Department of General Electric Company

CARBOLOY
DEPARTMENT OF GENERAL ELECTRIC COMPANY
11120 E. 8 Mile Street, Detroit 32, Michigan

Send me the following, without cost or obligation:

- ☐ Catalog supplement on CCS-2 Cutter Bit — CM-113
- ☐ Catalog and Maintenance Instruction Manual — CM-110
- ☐ Data on tuition-free Customer Training School
- ☐ Call by a Field Representative

Name _____ Position _____

Company _____

Address _____

City _____ Zone _____ State _____

AEROQUIP SELF-SEALING COUPLINGS

AND FLEXIBLE HOSE LINES

Speed Maintenance

WHEREVER FLUID-CARRYING LINES
MUST BE DISCONNECTED AND RECONNECTED

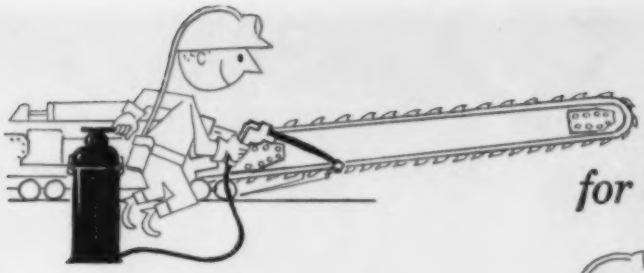
Speed **maintenance,** ***speed*** **repair operations and** ***speed*** **interchanging of accessories joined by fluid-carrying lines with Aeroquip Self-Sealing Couplings. Lines may be separated in a few seconds without loss of fluid. No air enters the system upon reconnection. There is no need to drain or prime the fluid system. One Self-Sealing Coupling takes the place of two shut-off valves.**

Aeroquip

REG. TRADE MARK

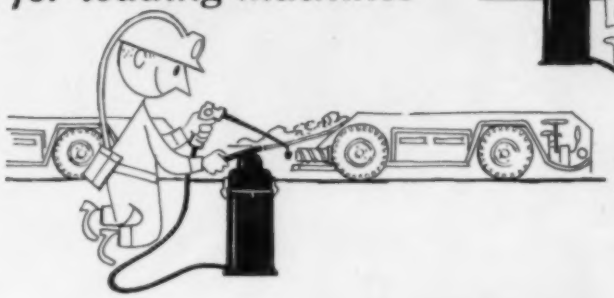
AEROQUIP CORPORATION, JACKSON, MICHIGAN

SALES OFFICES: Burbank, Calif. • Dayton, Ohio • Hagerstown, Md. • High Point, N. C. • Miami Springs, Fla. • Minneapolis, Minn. • Portland, Ore. • Van Wert, Ohio • Wichita, Kan.
IN CANADA: Prenco Progress and Engineering Corporation Ltd., Toronto • IN ENGLAND: Super Oil Seals & Gaskets, Ltd., Birmingham
AEROQUIP PRODUCTS ARE FULLY PROTECTED BY PATENTS IN U.S.A. AND ABROAD



for cutting machines

for loading machines



for shuttle cars . . .

only one is needed at the face

Here is a lubricant that can help you simplify lubricant storage and handling, and at the same time provide better protection for your equipment.

Gulf Mining Machine Lubricant can do the work of 2 to 3 other lubricants, depending upon the type of your equipment. It can usually do the entire lubricating job at the face, and is effective for plain and practically all antifriction bearings as well as for gears in drives and transmissions.

Why not have a Gulf Sales Engineer demonstrate the time-saving, cost-cutting advantages of Gulf Mining Machine Lubricant on your equipment? Contact your nearest Gulf office, now, and ask him to call.

GULF INDUSTRIAL LUBRICATION

Gulf Oil Corporation · Gulf Refining Company

1822 Gulf Building, Pittsburgh 30, Pa.

"I'm ordering machine bolts from Bethlehem again.

Their bolts are good, the kind you fellows like."

BETHLEHEM STEEL

Barber-Greene

B-G MINE CONVEYOR SYSTEMS FROM ROOMNECK TO TIPPLE

Made up of standard, factory-built "packaged" components. Eliminate "special" engineering. Complete installations made by simply putting together proper combination of easily assembled frames, supports, take-ups, etc.

B-G SLOPE CONVEYORS

Slope conveyors to meet every requirement—without the expense of special engineering or costly assembly—are available by combining the proper standardized permanent conveyor, factory aligned B-G Conveyor "packages." Frames, carriers, drives, take-ups, walkways, housings, A frames and hoppers—are all delivered clearly marked for easy erection. There is maximum flexibility in B-G design which enables you to lengthen, shorten or reassemble your B-G Slope Conveyor at different locations with 100% salvage.

B-G MAIN ENTRY BELT CONVEYORS

Made up of self-contained, interchangeable sections, these conveyors are widely preferred for collecting from several panel conveyors, conveying to tipple, railroad cars, standard mine cars, slope conveyor, etc. For such permanent or semi-permanent services, Main Entry Belt Conveyors are built according to heavy-duty mining standards: with large carriers, heavy drives, section frames of sturdy structural channel steel with welded steel supports. Standardized sectional construction simplifies transport of the unit to the location, speeds up installation. Note in photo at left how decking plates are bolted to the frame to fully protect the return belt.

B-G PANEL BELT CONVEYORS

Standardized design allows the selection of panel frame units suited to head room, lump size and other pertinent conditions. For last retreat operations or in fast moving panel work, B-G Panel Frame units are easy to install, knock down or reassemble. Couplings are designed for maximum rigidity; sections are easily aligned, built to withstand heavy impact, adaptable to lowest head room operations.

Write for complete information about the Barber-Greene line of coal handling conveyors—including special conveyors for barge loading, truck loading and stockpiling.

Barber-Greene Company
AURORA, ILLINOIS, U. S. A.

"Look what rib-pinching does to our shuttle car cable!"

"Sometimes the cable gets cut almost in half. And that's dangerous to the men. So we have to shut the machine down to make a splice. That costs money. Run-overs, rock splinters and sharp corners between the face and the main tunnel are tough on the cable! How can we make our cable last longer under these conditions?"

"Well, a few simple things can help you double cable life."

"First, careful handling is most important at all times. Another thing, avoid run-overs. A broken sheave or guide is a gamble. Don't pinch the cable on the roof, rib or bottom . . . and don't buy cable on price alone. *One break can cost you more than you can possibly save!*"

Here's why AnacondA shuttle car cables last longer

Did you know that recent surveys in 15 mines show ANACONDA flat-twin cables today last 300% longer than cables used on shuttle cars only a few years ago? Here's why. These cables have a *specially-compounded* neoprene jacket. You can't cut, tear or abrade it easily. Insulation is a new, harder-wearing form of cold rubber. An improved stranding, and a brand-new ground strip make this cable a lot tougher and a lot safer to handle.

Ask your Anaconda or distributor salesman to show you why you'll get more life out of this new cable—more safety—and more real economy. *Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y.*

the right cable for the job **ANACONDA®**
WIRE AND CABLE

There is only one Rust-Oleum

RUST-OLEUM®

STOPS RUST!

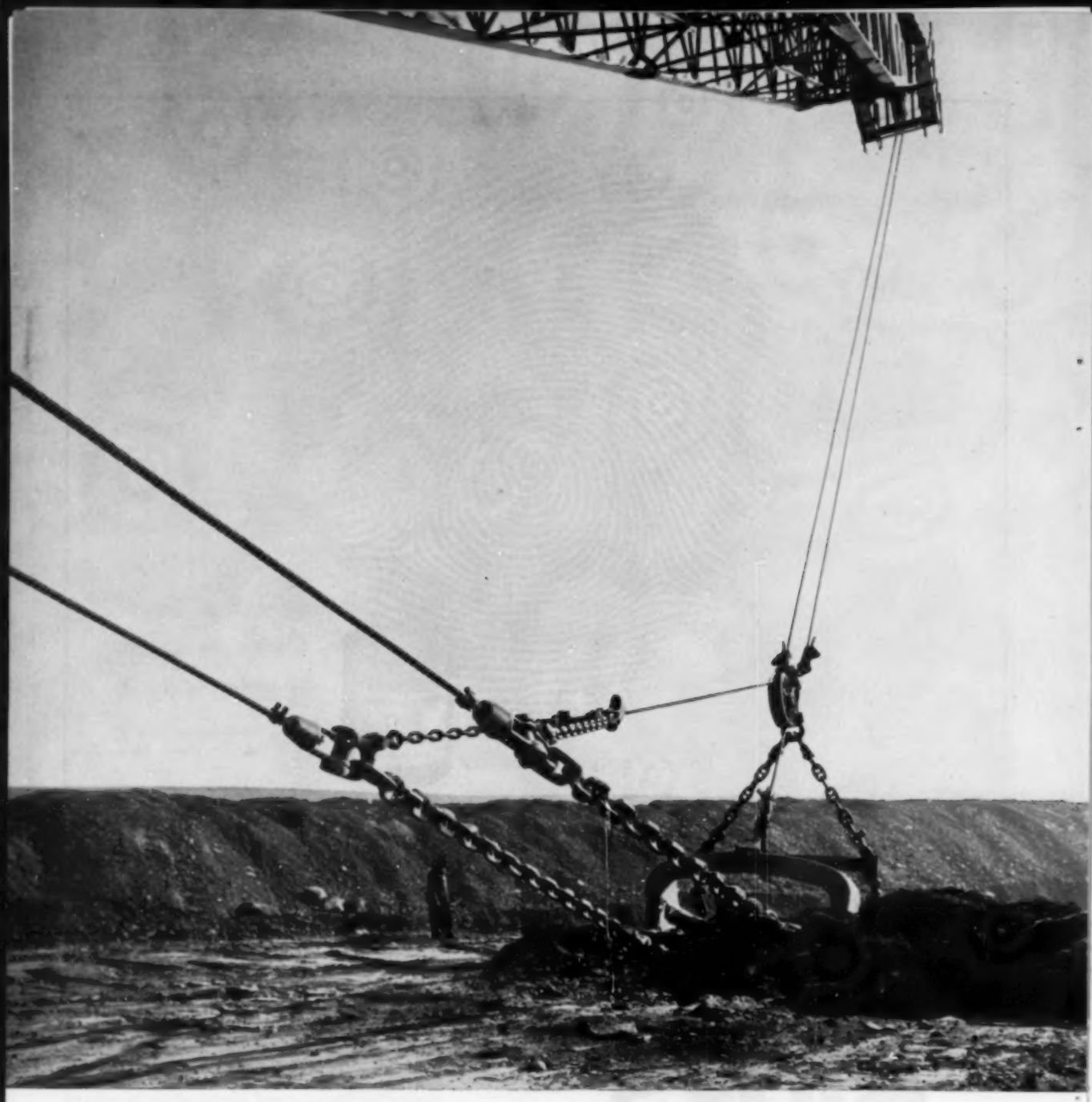
Specify Genuine Rust-Oleum
Accept No Substitute

The *exclusive* Rust-Oleum formula was developed by a Master Mariner during more than 20 years of combating the terrible rust-producing conditions of the sea. It incorporates a *specially-processed* fish oil vehicle that *dries*, is *odor-free*, and is formulated in *many colors*. It may be applied directly over *sound rusted surfaces* after scraping and wirebrushing to remove rust scale and loose particles. See why nearly every type of industry in the world has relied upon Rust-Oleum for over a *quarter century*. Clip the coupon to your letterhead and mail today.

RUST-OLEUM CORPORATION
2464 Oakton Street, Evanston, Illinois

Rust-Oleum Corporation
2464 Oakton Street, Evanston, Illinois
Gentlemen: I am interested in the *complete* Rust-Oleum story. Please send me the facts and the name of my nearest Rust-Oleum Industrial Distributor.

Name_____
Address_____
City_____ State_____



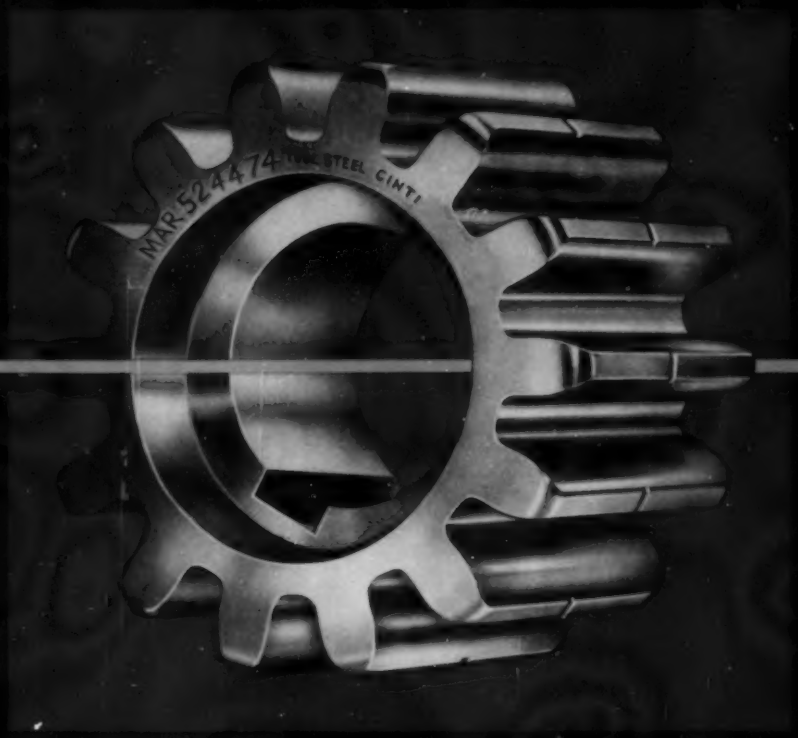
Wire Rope at Work—Here's a big pull that will yield more than 20 cu yd of overburden—one of many loads to be removed before the coal can be exposed. It's a large stripping job, and the prize is a rich seam of anthracite.

This excavator uses twin Bethlehem draglines and hoist lines, instead of the single type generally seen on smaller machines. The lines are Purple Strand, Bethlehem's toughest wire rope, and they make short work of even the heaviest loads. It's a rough daily grind, but when the ropes and the bucket start moving, that hard-packed overburden doesn't stand a chance.

Bethlehem Steel Company, Bethlehem, Pa. On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

Mill depots and distributors from coast to coast stock Bethlehem rope for the following industries and numerous others:

MINING • CONSTRUCTION • PETROLEUM • EXCAVATING • QUARRYING • LOGGING • MANUFACTURING



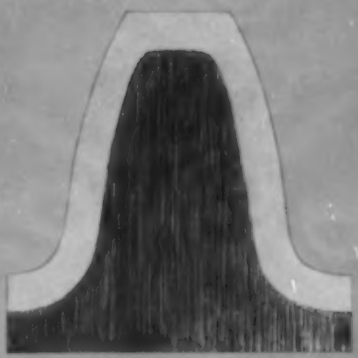
for guaranteed operating and maintenance savings

specify TSP gears and pinions

HERE'S WHY: "Tool Steel Process" gears and pinions are hardened by our special process. The file hard surface, to the full depth of permissible wear, gives *maximum life*. The core, refined for toughness and ductility, gives *maximum strength*. This combination gives TSP gears *maximum resistance* to fatigue. These are truly superior qualities found only in TSP gearing.

Made in all sizes to 80" pitch diameter, and in pitches from the heaviest to 10 D.P. Special designs made to your requirements.

You receive an absolutely positive written guarantee that TSP gears and pinions will give a longer life in the same service than any other product.



Section through TSP gear tooth, the gear of:

1. MAXIMUM RESISTANCE TO SURFACE WEAR
2. MAXIMUM RESISTANCE TO STRESS AND FATIGUE
3. MAXIMUM CORE STRENGTH AND TOUGHNESS

THE TOOL STEEL GEAR AND PINION CO.
CINCINNATI 16, OHIO, U. S. A.

AD 1005

The World's Standard of Quality Since 1909 for Gears • Pinions • Rolls • Wheels and Other Hardened Products

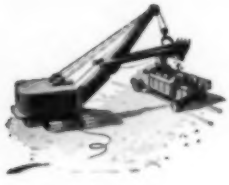
THE GREATEST NAME IN ELECTRICAL WIRE AND CABLE

New! Improved!

SUPER SERVICE... is better than ever

...better
impact and crush resistance

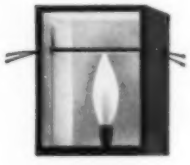
...better
tear resistance



...better
abrasion resistance
and tensile strength

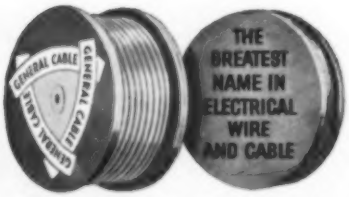
...better
flexing endurance

...better
resistance to kinking



...better
flame and heat resistance

...resists all your costliest hazards far beyond accepted field requirements!



BARE, WEATHERPROOF, INSULATED WIRES
and CABLES FOR EVERY ELECTRICAL PURPOSE

New SUPERTUF, General Cable's lead cured jacket on *new* SUPER SERVICE eliminates ply separation, resists crushing, tearing and abrasion. Special cord reinforcement within the SUPERTUF jacket gives extra tensile strength and longer cable life. In addition to meeting IPCEA specifications the new lead cured construction provides positive embossed product identification.

THERMAX heat resistant insulation gives top protection against temporary current overloads and extends the operating life of the cable. Flame resistance of the new SUPER SERVICE cable far exceeds requirements of the Federal Bureau of Mines.

New, more compact design prevents sleeving of the core from the jacket. Result: a well balanced product that performs better, lasts a lot longer, needs less replacement...costs no more! Why settle for less? See your friendly General Cable Representative today!

GENERAL CABLE CORPORATION

420 Lexington Avenue, New York 17, New York • Sales Offices: Atlanta • Buffalo Cambridge (Mass.) • Chicago • Cleveland • Dallas • Detroit • Greensboro (N. C.) • Houston Indianapolis • Kansas City • Los Angeles • Milwaukee • Minneapolis • New York • Newark (N. J.) • Philadelphia • Pittsburgh • Portland (Ore.) • Rome (N. Y.) • Rossmoyne (Ohio) (Cincinnati area) • St. Louis • San Francisco • Seattle • Syracuse • Tulsa • Washington, D. C.

Shaves time from every working cycle

Le Roi Transo TLF-150 Front-end Loader

YOU move more material—faster—at lower cost — with this Le Roi Transo 1½-yard Front-End Loader. It saves you money every minute it's working — and here's why:

You load faster — because . . .
Patented "bucket-rocking action" helps you get a full bucket load within seconds, without tire-spin or undue strain on the loader.

You travel faster — because . . .
Four-wheel drive and low center of gravity provide powerful traction. Torque converter transmits power fast and efficiently. You get in and out in a hurry — in sand, mud, snow, or rocky terrain. Planetary-type reversing transmission cuts reversing time 95%.

You can maneuver the TLF-150 easier and in less space, thanks to power steering, short (84") wheelbase, short over-all length, and small turning radius. Low carrying position of bucket gives operator especially good vision and provides an extra margin of safety.

You dump faster — because . . .
14-foot maximum dumping height and 3-foot reach let you spot loads quickly with pin-point accuracy over high truck tail-gates, bins, hoppers.

Now, don't just take our word for all this. See a Le Roi Transo TLF-150 in action, see how it makes shorter work of your material-handling jobs—how it cuts time and costs. Have your nearby Le Roi distributor arrange a demonstration.

Write for latest bulletin.

TD-12

TRANSO DIVISION LE ROI

LE ROI COMPANY

A Subsidiary of Westinghouse Air Brake Co.
TRANSO DIVISION
MILWAUKEE 14, WISCONSIN

Plants: Milwaukee • Cleveland — Greenwich — Dunkirk, Ohio • Coldwater, Michigan

AMOCOal Territory

Specialized Mine Lubricants and Service All Over the Map!

For expert engineering consultation on any mine lubrication problem . . . for products of proven performance, call or write your nearest American Oil Company office located in the colored area above. Principal distribution points are listed below.

PENNSYLVANIA
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Blairsville
Covington
East Butler
Greensburg
Greenville
Grove City
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Johnstown
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New Castle
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Pottsville
Punxsutawney
Scranton
Sharon
Sunbury
Tarentum
Uniontown
West Bridgewater
Wilkes-Barre
Williamsport

WEST VIRGINIA
Beckley
Bluefield
Charleston
Clarksburg
Elkins
Huntington
Morgantown
Petersburg
Rainelle
Summersville
Warwood
White Sulphur Springs

MARYLAND
Cumberland
Oakland

OHIO
Marietta
Youngstown

AMOCO LUBRICANTS
FOR MINE MACHINERY

AMERICAN OIL COMPANY • FROM MAINE TO FLORIDA

Announcing THE NEW ATHEY PR21 REAR-DUMP TRAILER

Wide-mouthed body makes an easy target for fast-swinging shovels. Bottom is a sandwich—¾" high-strength steel top plate, oak-plank filler, ½" bottom plate. Heavy side sheets are reinforced with box-sections.

THE HAULING COMPANION FOR THE CAT DW21 TRACTOR!

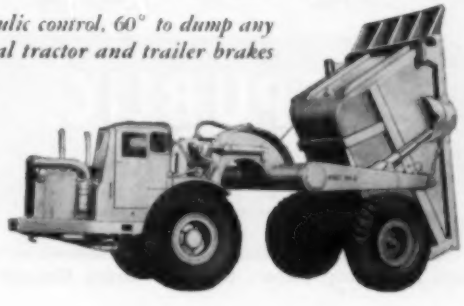
The high-speed Cat DW21 has a new production teammate—a hydraulically-controlled trailer that can take on a heaped load of hard rock, haul at speeds up to 20 MPH, and dump the load over steep banks in complete safety. The new high-production, high-profit, rear-dump hauler is the Athey PR21 Trailer.

The PR21 is built of high-strength steels to take anything rock can dish out. All-welded, frameless design reduces and absorbs the twist and torque of rock loading, hauling and dumping. The PR21 matches its DW21 teammate in capacity, performance and dependability—a combination that pays off in production and profits.

- All controls in easy reach!
- Powered by 275 HP (ASME peak rating) Cat Diesel!
- Anything that goes in will come out!
- Low height, wide body for fast loading!
- Hydraulic steering retains feel-of-the-road!
- Operated by powerful Athey 3-stage telescopic hoists!
- Heavy draft frame of ¾" and 1" steel!
- 24:00 x 29 36-ply rock-grip tires provide traction-flotation!

Your Athey-Caterpillar Dealer has complete specs and performance data. See for yourself why the new PR21 assures trouble-free work schedules and profitable production. Call on him or write direct to...

Body tilts, under hydraulic control, 60° to dump any load cleanly. Individual tractor and trailer brakes provide extra margin of safety. 90° turns eliminate lengthy maneuvers on the fill, permit turns in 34 feet!



Athey
PRODUCTS CORPORATION
5631 West 65th Street
Chicago 38, Illinois

ATHEY—Pioneers and Specialists in the Trailer Field!

REPUBLIC

MINE ROOF BOLTS

Two Types to Help Minimize Roof-Fall Accidents

REPUBLIC ROOF BOLT
A ¾-inch rolled-thread bolt with square-head and forged washer.
Can also be furnished in ⅝-inch diameter high strength.

REPUBLIC SLOTTED ROOF ROD
A one-inch rolled-thread rod with slotted end to take wedge. Furnished with hex or square nuts and various size roof plates.

● To help mine operators minimize the danger of roof-fall accidents, Republic makes two types of mine roof supports. Each type, either the square-head bolt or the slotted roof rod, can be used for vertical or angle bolting—depending on the roof strata encountered.

Shanks are tough and sturdy to withstand severe shock and vibration. Threads are clean, sharp and accurate for full strength bolting-up. Bolt heads and nuts are square-faced for snug wrenching; there's less chance of slipping or deforming.

Republic Mine Roof Bolts are made in a variety of lengths from 18 inches to 90 inches—special lengths on request. Write us for additional information on Republic Roof Bolts.

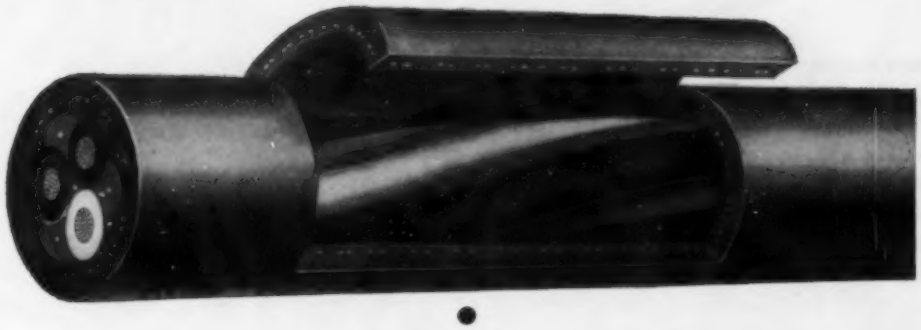
REPUBLIC STEEL CORPORATION
Bolt and Nut Division • Cleveland 13, Ohio
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, N. Y.

REPUBLIC STEEL

REPUBLIC BOLTS AND NUTS

Other Republic Products include Steel and Plastic Pipe, Tubing, Lockers, Shelving — Carbon, Alloy and Enduro Stainless Steels — Titanium

TAKE A GOOD LOOK!



When a skilled mechanic looks for trouble, he lifts the hood. And an engineer knows, too, that looking beneath the protective sheath is a good check on construction quality in mining machinery cable. The Hazaprene ZBF sheath on all Hazacords is tough and highly resistant to flame, oil, sun, water and acids. Yet the Hazacord components on the inside are equally important for long service life.

Take a look inside. First are the conductors, specially coated to resist corrosion. The large number and short lay of the strands plus the short lay of the insulated conductors provide an easy-to-handle flexibility.

Second, extra service life and protection are assured by Hazard's tough, resilient, heat-resisting rubber insulation.

Third, unlike fibrous fillers which sometimes act like a wick, Hazacord fillers are made of Hazaprene and will not absorb moisture. This construction provides a tight-fitting, compact structure which will resist the severest mechanical abuse.

Fourth, all components are specially "lubricated" to provide a working assembly that insures maximum flexibility.

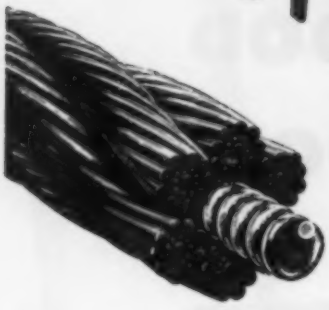
Inside and out, Hazacord mining machine cables are constructed to assure a minimum of trouble and a maximum of dependability. Write for the Hazard Mining Catalog. Hazard Insulated Wire Works, Division of The Okonite Company, Wilkes-Barre, Pennsylvania.

HAZARD *insulated cables*

1959

Another J&L First—

SpringKore WIRE ROPE



Combines Flexibility and Crush Resistance

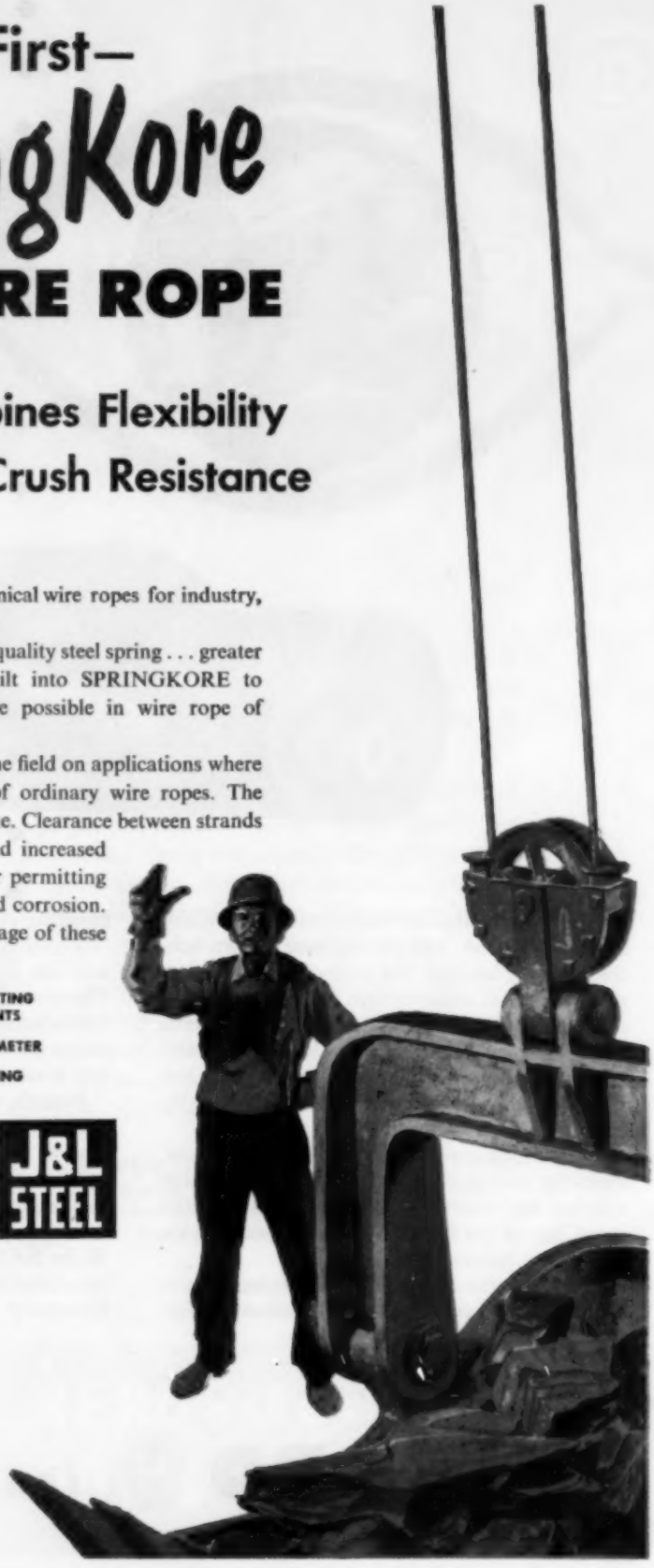
Always working to develop better, more economical wire ropes for industry, J&L has scored another first—SPRINGKORE.

The unique properties of a tightly coiled high quality steel spring . . . greater flexibility and resistance to crushing—are built into SPRINGKORE to provide resiliency and toughness never before possible in wire rope of equivalent strength and cost.

SPRINGKORE has *already* proved itself in the field on applications where heavy crushing action limits the service life of ordinary wire ropes. The diameter stays uniform for a longer period of time. Clearance between strands is maintained resulting in greater flexibility and increased fatigue life. The coiled spring forms a reservoir permitting excellent lubrication to reduce internal wear and corrosion.

Specify new SPRINGKORE and take advantage of these dollar-saving features:

- LONG TERM FLEXIBILITY
- RESISTANCE TO CRUSHING ACTION
- COMPLETE LUBRICATION
- MORE SUPPORTING CONTACT POINTS
- UNIFORM DIAMETER
- BETTER SPOOLING
- LESS INSIDE STRAND WEAR



Jones & Laughlin
STEEL CORPORATION — *Pittsburgh*

J&L STEEL

For further information, write for J&L's new booklet, "New Wire Rope for Industrial Uses."

Jones & Laughlin Steel Corporation
3 Gateway Center, Dept. 411, Pittsburgh 30, Pa.

Please send me a copy of your booklet, "New Wire Rope for Industrial Uses."

Name_____

Company_____

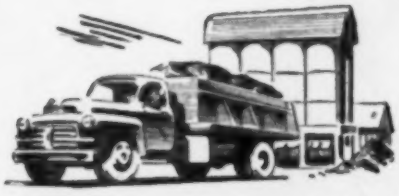
Address_____

Eaton 2-Speed Truck Axles

POWER WHEN NEEDED, SPEED WHEN WANTED

MORE AND QUICKER FULL-LOAD TRIPS

LOWER OPERATING AND MAINTENANCE COSTS



More than two million Eaton Axles in trucks today!
For complete information, see your truck dealer.

EATON

AXLE DIVISION
MANUFACTURING COMPANY
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PRODUCTS: Sodium Cooled, Poppet, and Free Valves • Tappets • Hydraulic Valve Lifters • Valve Seat Inserts • Jet Engine Parts • Rotor Pumps • Motor Truck Axles • Permanent Mold Gray Iron Castings • Heater Defroster Units • Snap Rings Springtites • Spring Washers • Cold Drawn Steel • Stampings • Leaf and Coil Springs • Dynamatic Drives, Brakes, Dynamometers

NOW! the *American*

SAMPLE CRUSHER

with the New Adjustable SAMPLING HOPPER

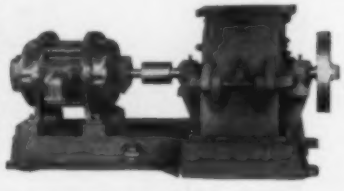
Model 9x9 American Sample Crusher with adjustable sampling hopper.

gives you a 5%-10%-15% or 20% Sample of a Sample

...*in One Operation!*

THE NEW American Adjustable Sampling Hopper gives you a truly representative sample . . . as much or as little as you need, in any amount from 0 to 20% *by simply setting a dial* . . . and does it in *one* operation – so quickly and efficiently that there is no loss of moisture content in the sample.

When teamed up with one of the famous American Sample Crushers (as the Model 9x9 illustrated above), your crushing operations are FAST, because you can crush as much as a ½ ton per hour . . . EFFICIENT, because you have a once-through operation . . . and LOW COST, because there's practically no wear-out to an American Sample Crusher.



Model 15x9 American Sample Crusher, for capacities up to 2,000 lbs. per hour. For larger capacities, we recommend the American "13" Series (capacities up to 6 tons per hour).

WRITE for complete literature on American Coal Sample Crushers

American PULVERIZER COMPANY

Coal Crushers up to 800 TPH
Sample Crushers up to 6 TPH

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Ave., St. Louis 10, Mo.

Strength

HANDLING EASE • WEAR RESISTANCE

you get ALL three in Yellow Strand

In wire rope, it takes a balanced combination—of strength, flexibility and wear resistance—for longer, trouble-free service.

Yellow Strand has strength—from higher quality materials manufactured specifically for wire rope production. Yellow Strand has flexibility—from engineered design and precision care in construction. Yellow Strand has wear resistance—each wire, each strand is lubricated for internal protection.

In Yellow Strand you get all the qualities needed for long life and lower wire rope costs . . . and you get this big, money-saving bonus—

With Yellow Strand Speedi-Service, you can call your convenient Broderick & Bascom Distributor and tell him you need a certain line for a certain machine.

Skilled wire rope men check a file card on your equipment to determine length, size, grade and type of rope needed for the machine.

you get SPEEDI-SERVICE too!

The rope you need is taken from ample stocks controlled by the record cards. Your order is on its way to you in minutes instead of hours.

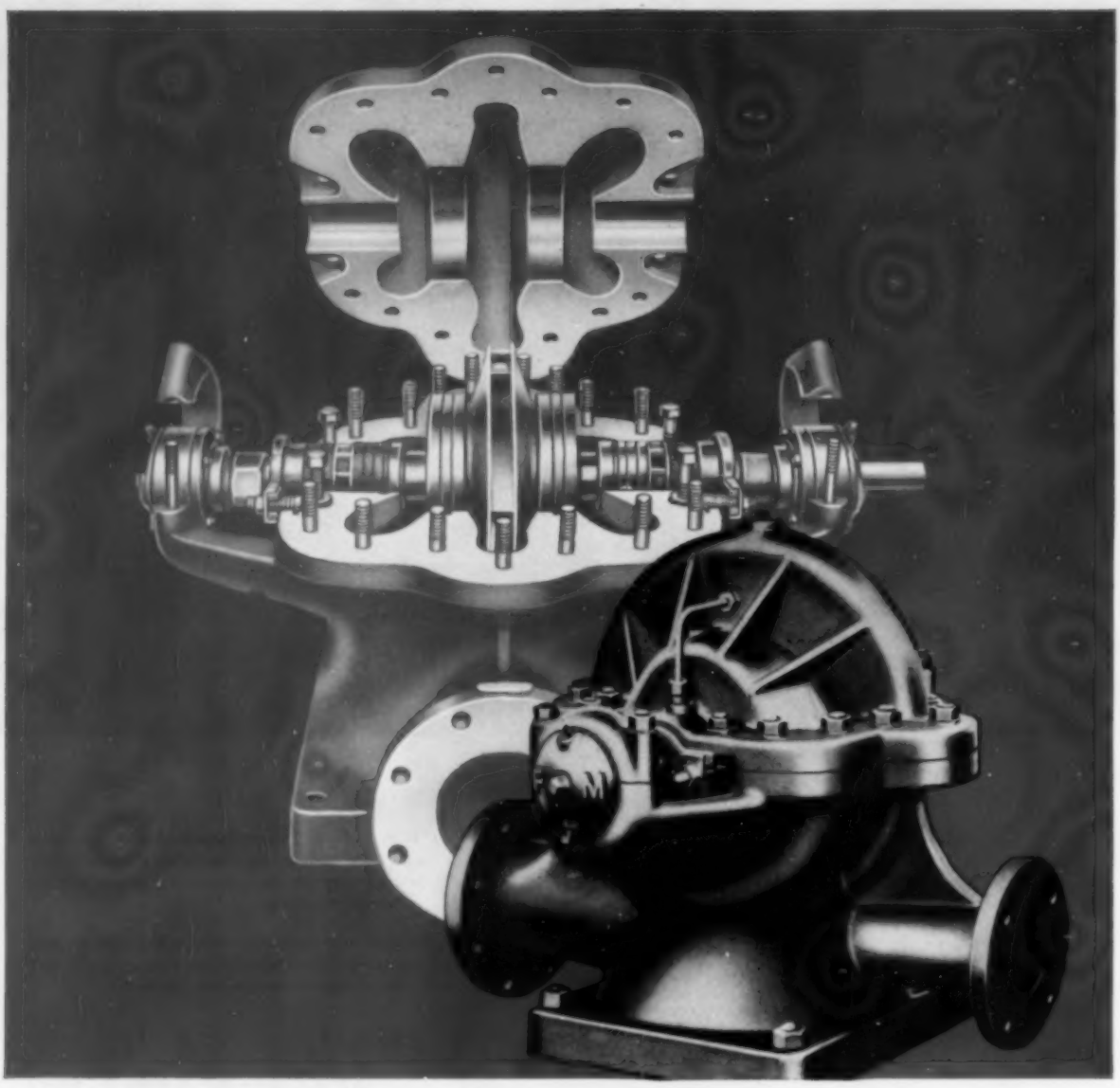
You cut machine down time, save costly man-hours and records! You can start your Yellow Strand Speedi-Service Plan—without charge—by calling your nearby Broderick & Bascom distributor or by writing to the address below.

SPECIFY

Yellow Strand

FOR SAVINGS . . . SAFETY . . . SPEEDI-SERVICE

BRODERICK & BASCOM ROPE CO.
4203 Union Blvd., St. Louis 15, Mo.



out of the mouth of a pump...

Suppose a pump could "spill its works" . . . tell you how it was made . . . speak of the design, material, workmanship that went into its being . . . then you could know . . . and buy with confidence.

Because after all, pumps do look very much alike. How, then, to tell which make is best for you. *Reputation* is one way, *performance* another.

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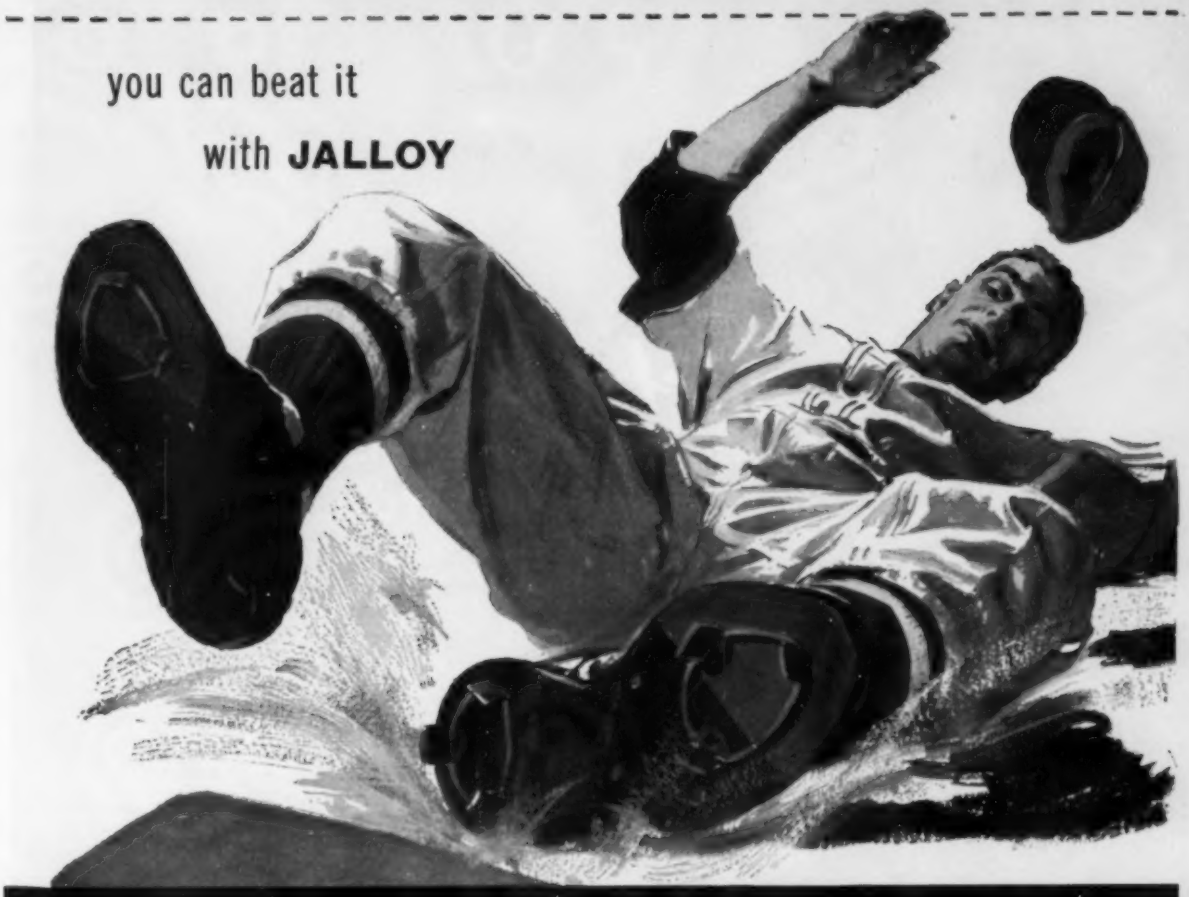

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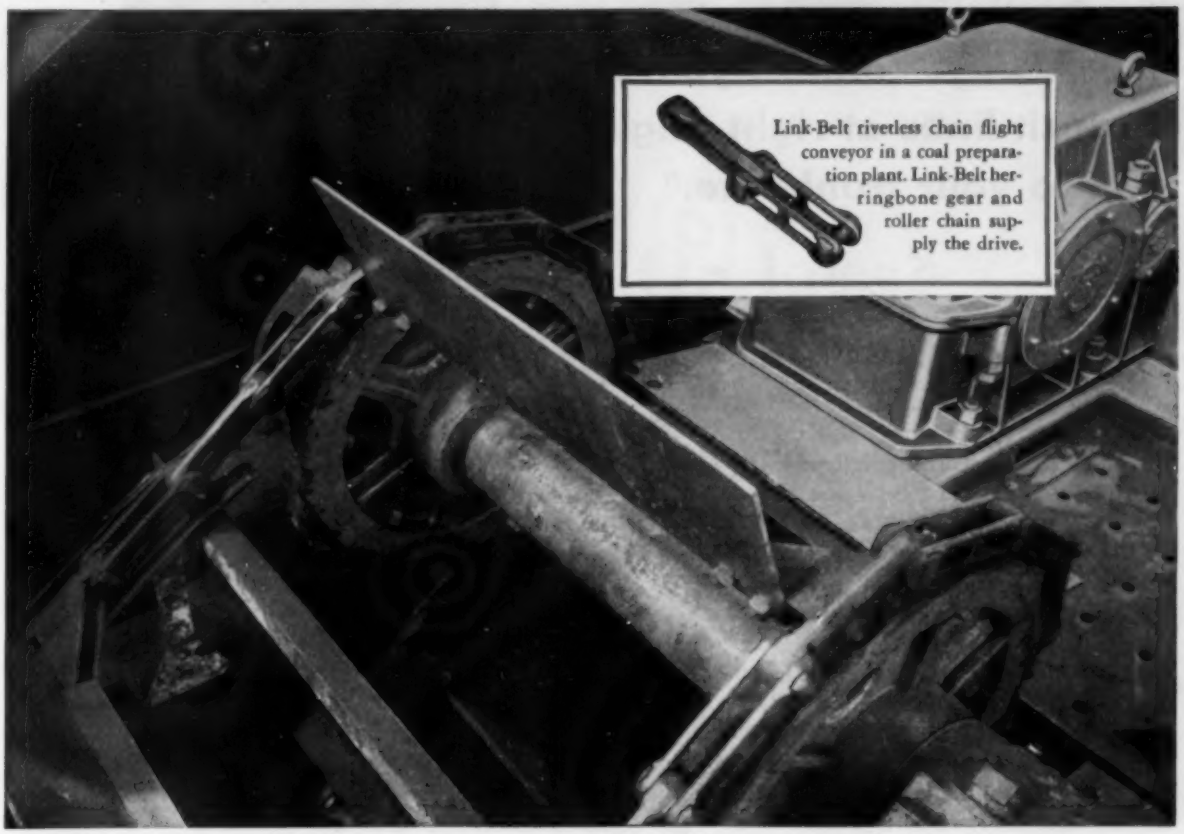

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PROVED and APPROVED

Devoted to the Operating, Technical and Business Problems of the Coal-Mining Industry

Coal Age

APRIL, 1954

IVAN A. GIVEN, EDITOR

More . . . Or Less?

IS THE PRESENT period of low coal demand a prelude to continued and perhaps accelerated losses? Or, to put it another way, is coal at last headed for the ditch. Should it pull in or should it expect to grow with a growing economy? Stating the pros and cons requires looking beyond the day and even beyond the year, and the conclusions reached necessarily have a bearing not only on the effective conduct of operations now but on planning for the future.

Possible or Not?

Perhaps a different approach to the question of what will happen in coal's markets might serve to put things more nearly in their true perspective. For this purpose, assume that the worst comes to pass in bituminous markets, for example. Could railroad consumption (28,000,000 tons in 1953) completely disappear? Possibly, but the coal-fired gas-turbine locomotive is still very much in the picture, and its use would be favored by a significant differential in fuel costs.

Retail and Industrial

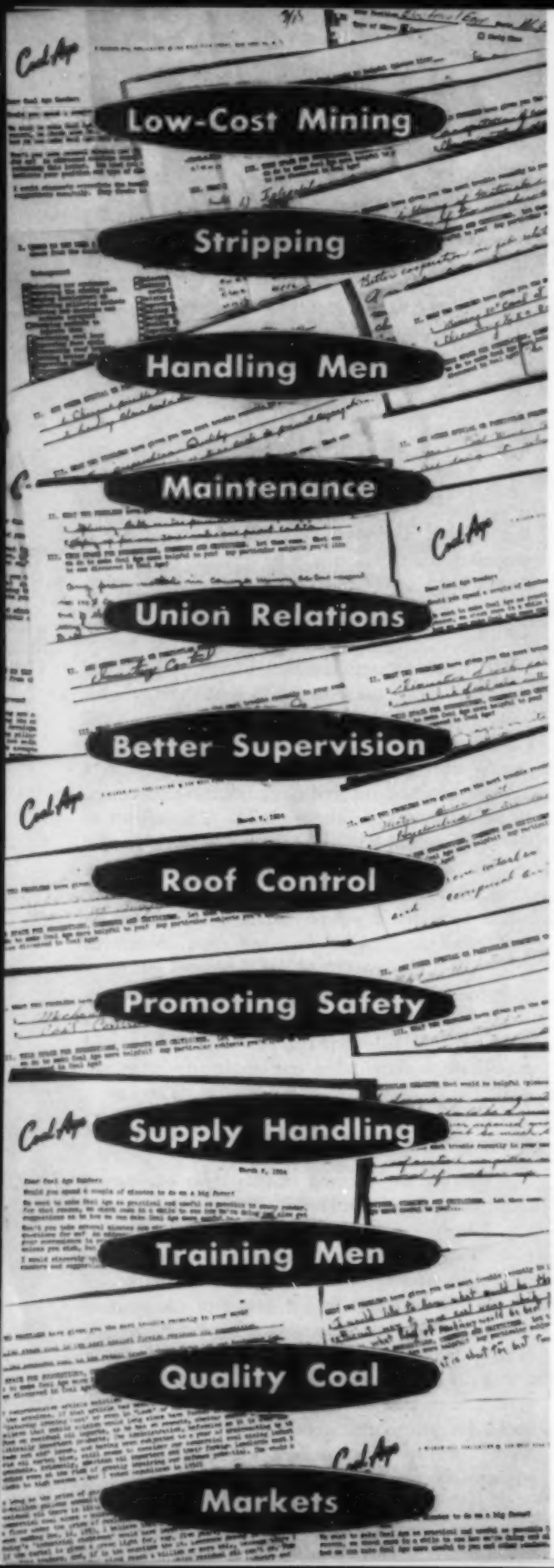
Could the retail market (61,000,000 tons in 1953) also disappear? Again possible, but it is difficult to think of anything more than a further reduction on a gradual basis over a period of years, even if new equipment and new service methods, plus rising costs of competitive products, do not give the home market a new lease on life. Could the steel-mill, cement-mill and general industrial market (112,000,000 tons) disappear too? Also possible, but it gets harder to believe that a market of this size, where coal has a good cost edge even now, could fade away, let alone suffer a sizeable reduction. In fact, experience has shown better merchandising and engineering service broadens this market. Therefore, as more of this service is rendered, the trend should be upward rather than downward.

Coke and Utilities

But if, for argument's sake, it could be conceded that all these markets could fade away, what about coke (113,000,000 tons in 1953), and electric utilities (112,000,000 tons)? Smelting iron ore requires coke and it is an essential item in a number of chemical and manufacturing processes. If the economy continues to grow, it is difficult to see anything but growth ahead for coke. As for the utilities, coal's cost advantage is so great, except where dumping of other products prevails, that the future increases in power output will be based on that product. Thus, if expected rates of growth take place, the combined requirements of these industries should rise to over 335,000,000 tons by 1960. Thus, even if only these consuming industries were left in 1960, their requirements alone would necessitate a respectable coal-producing establishment.

Strength to Build On

Whatever the method employed in evaluating the course of coal demand, it is difficult to see how any major portion of it could be killed off completely, or even how it can suffer any more than modest declines for a time, even without allowance for further increases in the prices of competitive fuels. The conclusion is that coal has basic strength in its major markets and can be made equally strong in others. Even today's difficulties cannot detract from that strength, which is a real springboard for advancement through lower costs and higher quality, plus modern merchandising and engineering service.



19 Mining

1. "Low-Cost Production"

PERHAPS ONE ROAD to the highest efficiency and the lowest cost in production is to consider the main ingredients in cost. Aside from royalties, taxes, depletion, depreciation and the like, they are labor, power and operating materials. Labor is the most expensive of all, and it naturally follows, therefore, that emphasis should be placed on its conservation. The machine is the main answer, and the goal, logically, should be the use of high-capacity machines for all possible operations.

The mere installation of machines, however, is not the entire answer, especially with the machines that do the actual loading or the complete mining job. The goal in operation should be use of the machines at as near rated capacity as possible the maximum length of time per shift. This, incidentally, conserves labor because the more productive a machine is, the fewer will be required for a given tonnage.

Thorough study of the operation is the answer to most of the questions that pop up in increasing machine productivity. Time study is an accepted tool for this purpose and, among other things, it provides facts on which production rates can be set. With these rates for the various types of units, it then becomes easy to pick out the units that are not producing and find out why, after which the logical remedies can be applied. Time study is primarily sitting down with a watch and pad and finding out particularly what causes delays and why. Some of the reasons for delays might well turn out to be the following:

1. **Dust, smoke and water.**
2. **Long machine moves** because of lack of concentration of working places.
3. **Small tonnage per fall,** which might be increased by deeper cutting or widening the place—if it can be safely done.
4. **Interruptions in transportation,** causing loader or miner waits.
5. **Lack of balance in the face cycle,** meaning, for example, that the loader has to wait on cutting, drilling, etc.
6. **Difficulty in loading** as a result of failure to get good breakage. This might be a result of poor bugdusting, as an example, which in turn brings up the question of when and when not to use men. If the addition of a man results in an increase in over-all tons per man for the crew, then the man is a good investment.
7. **Excessive machine breakdowns,** reflecting defects in maintenance.
8. **Interference with production** as a result of lack of supplies—say, timber for a place, a small part that would permit getting a machine back into operation faster, and so on.
9. **Sluggish operation** and increased breakdowns as a result of poor power at the face.

Summed up, getting high efficiency and low cost means

Problems Today

What Coal Men Report Them to Be

What Can Be Done to Solve Them

giving the machine or the man doing the loading or mining the best possible opportunity to produce. Doing that means careful, continuous study of what is going on to locate and break bottlenecks.

The same principles apply to other operations back of the face. For example, poor track, excessive grades, and haphazard operation of haulage facilities can add at least one and sometimes two or three locomotive units to the total that otherwise would be necessary. And from the equipment standpoint, of course, two small locomotives, as an example, require two crews, compared to one for a larger unit handling the same tonnage.

Suggestions for low cost in power and supplies are included in other sections in this discussion of mining problems, though at this juncture it might be pointed out that while power is essential for good operation of production equipment there are opportunities for keeping down its cost. For example, two-way air travel, pumping long distances through small lines and the like increase power use and cost.

Finally, on the question of manpower conservation, cutting down travel time increases time spent in actual work, and in view of wage scales today may warrant substantial investments in new portals and improved man-trip facilities.

2. "Mining Thin Coal Efficiently"

SINCE MINING A THIN SEAM of coal necessitates covering a substantially greater area for the same tonnage, and because working in cramped space makes labor less effective, thin-seam mining seldom can be as efficient as mining in thicker coal, although new equipment now available is materially reducing the differential. This new equipment, in fact, holds out real promise for the thin-coal miner. It includes low-type continuous miners, which are making a very creditable showing in coal down to 40 in thick; the remotely controlled miner—for the present operating from the outcrop—and the coal planer and similar equipment. Since machines can be designed so that they do not know the difference between thick coal and thin, and can be arranged to operate with a minimum of manpower, the opportunities for efficient thin-coal mining are increased accordingly.

Pending the further development and application of the new machines, the thin-coal operator must cope with the necessity for more cutting, more timbering, more development and more of many other things for the same tonnage. This in turn emphasizes the necessity for efficiency in all such operations. Ways and means of increasing efficiency include:

1. **Use of self-loading conveyors** where conditions permit.

2. **Use of equipment that is easy to move** and place, such as face conveyors fitted with rollers, lightweight aluminum shaker troughs, etc. Pullers and carriers cut down moving time and labor.

3. **Revision of the mining plan** to increase to the maximum the volume of room work per foot of entry. An example is the continuous-room system in which rooms are carried parallel to the entry for distances of 1,200 ft or more, meaning that the room units advance more or less uninterruptedly straight ahead for that distance. The moving problem is simplified, especially if an extra cross-conveyor drive is provided to permit picking up the room units at the usual distances.

4. **Arrangement of development work** to make it as near like room work as possible.

5. **Mechanization of rock work** where top or bottom is taken for height.

6. **Use of equipment such as belts,** low-bed man cars and the like to reduce rock work in production sections. The belt also is an example of equipment operating with a minimum of manpower.

7. **Deeper cutting,** where possible, to reduce face-preparation labor and explosives requirements, and raise tons per fall.

Again, the key to efficiency is studying all operations to see where improvements can be made.

Readers' Choice!

WHAT ARE the things that give coal-mining men the most trouble today? As part of its program of constant checking on the usefulness of its material, *Coal Age*, for the past eight months, has been asking its readers this question: "What two problems have given you the most trouble recently in your work?" The total listed mounts to an impressive number, but the major ones, as indicated by the title of this article, add up to 19. What they are, as *Coal Age* readers list them, and what can be done about them, in the light of field checking by the *Coal Age* editors, are the subjects of this article.

3. "Continuous-Mining Plans"

MINING PLANS for continuous-type equipment are somewhat fixed by the type of machine. Some designs can work in practically any standard mining setup, particularly room-and-pillar. Others work better when they go straight ahead as much as possible with a minimum of turns for crosscutting, pillaring, etc. Others, such as the coal planer, must be operated on walls. Gas and dust must be considered to a greater extent in continuous mining than in other types, and provisions for adequate air may be a major element in the final decision. To a lesser extent, also, the mining plan must allow for the problems of good roof support, delivery of supplies to the face, and so on.

The mining plan may be a critical factor in the results in continuous mining but, as with other types of mining, results may be affected more by other things. An example is transportation, which has come out as perhaps the major problem in the operation of continuous machines, since their capacity so far is relatively low and consequently they must operate as nearly continuously as possible, as a rule, for the maximum in results. The pickup loader has proved itself as one means of getting continuity in miner operation, and increased attention is being given to the use of conveyors which, properly applied, provide the maximum in continuity of haulage. Among the conveyor types being increasingly considered are the extensible belt conveyor, the tandem bridge conveyor (February, 1954, *Coal Age*, p 92) and the articulated conveyor (January, 1954, *Coal Age*, p 64).

4. "Better Stripper Performance"

WITH A GIVEN BANK and given machines, the key element in the efficiency of a stripping operation is the performance of the stripping units. The major factor in stripper performance is the condition of the material handled, which in turn leads to emphasis on preparation of the overburden. Perhaps next is the way the stripping unit is operated.

Nothing is more conducive to high stripping yardage than loose material of the proper size for the dipper or bucket being used. Drilling and shooting therefore become the first line of attack. New drilling units, particularly of the vertical type, are providing major increases in drilling footage and size of holes and are helping mightily to achieve a drilling pattern that provides effective breakage with a minimum of explosive, all working together to produce a better overburden at the cheaper preparation cost. Even with existing equipment, the preparation method is worthy of concentrated effort to attain the maximum in effective breakage.

The way the stripper is operated can make up to 10% or more difference in yardage per shift. First, operation at extreme range naturally cuts down production. It follows that where banks are high and maximum performance is desired auxiliary equipment can render a real service by knocking off the peaks. Positioning the stripper and operating it to keep swing to a minimum materially raises the number of passes, especially if a slicing rather than a hogging cut is made and the swing is started as soon as the dipper is filled. Indicators to show when the dipper is filled have proved most helpful at a number of properties. Using the stripper to achieve final cleanup of loose material also is a time-consumer. A tractor to keep the loose material pushed up can more than save its cost through greater yardage.

5. "Getting Men to Work Better"

ACHIEVING THIS GOAL might be stated as a matter of fostering interest in the job and making it easy for the man to perform. One way is to set a good example. Study your job and work at it. If your men feel that you know where you are going and how to get there, and can see that you are on the ball, they are much more likely to go along themselves, especially if you make it a policy to show how their efforts result in better performance and low cost, and that these in turn result in more sales and more working time. Acceptance of that principle by your crew in turn leads to a better spirit of cooperation and, among other things, acts to prevent slacking, unnecessary absenteeism and so on. But on absenteeism, which cannot be avoided at times, you should have an advance plan for temporary reorganization of your work so that you still will meet your goal. It can be done.

Men do more if they feel that their supervisor has a personal interest in them as individuals and is willing to give credit where credit is due. They also work better when they know what is expected of them and how their jobs fit into the over-all crew picture. They also can accommodate themselves better to changes in equipment, conditions and methods if they receive a full explanation of what the new program will be and why it is being adopted. And when you ask a man to do something different, make sure your instructions are clear and that he knows why. And if, after everything else is done, a man still stands out as a square peg in a round hole, see if there isn't another job elsewhere that will suit him better. There almost always is.

On the preceding basis, there will be little necessity for discipline, but when and if the time does come, make it a matter between the man and yourself only, and be fair while being firm, with, of course full explanation.

Making it easy for men to perform is a matter of seeing to it that nothing gets in the way of his getting the most out of his equipment. Where power is bad and machine breakdowns are frequent, men inevitably arrive at a "what's the use" state of mind. Much the same thing happens when supplies are not available, transportation is slow, they have to contend with water and mud, and so on.

Incentive also is a powerful stimulus to performance. For example, matching your crew's performance with others in the mine appeals to the competitive spirit almost no man is without. Another powerful incentive is a pat on the back for a good job. Still another is an active interest in suggestions for improving results. Suggestions should be encouraged because the man who actually has to do the job quite frequently can come up with an idea for doing it better. Of course, to top everything else, you will make it a practice to train and retrain men in the best ways of doing the work at hand, including emphasis on the safe way as the most-efficient way.

6. "Reducing Complaints and Grievances"

A GOOD RULE for reducing complaints and grievances is to stay ahead of your men in spotting the things can result in complaints—water, unprotected trolley wire, equipment in bad shape, awkward man-trip facilities, dirty washhouses, and so on—including, perhaps, your own attitude and actions. Look for things that might cause complaints, and when you spot them move fast to correct the condition. If the situation cannot be avoided, explain,

show how to minimize the discomfort, and let them know how long the situation will last.

When complaints do come up, listen patiently and attentively. Never try to duck facts. Actually, getting down to facts is the best way of getting a man to the point where you can satisfy him. Sometimes, too, complaints are deeply buried and it may be worthwhile to find out if sickness at home or something else has the man on edge.

Deal fairly and quickly with all complaints, but only on the basis of facts. Unless you act quickly, a complaint may become a grievance. In fact, when it gets around that you are interested in complaints and want to do something about them, the number is quite likely to decrease.

Be reasonable and pleasant, but not a pushover. You are the management's man, and it is up to you to guard the company's interest as well as the interests of the men you supervise.

7. "Preventing Machine Breakdowns"

SINCE GREATER SUMS OF MONEY are being invested in new mining machinery to produce coal with less effort, it is becoming increasingly important that these machines be kept working continuously if labor cost is to be kept to a minimum. Systematic and thorough inspection, positive lubrication, high-quality materials and good power are keynotes in preventing equipment failures. Along with these must be included skilled men—and the facilities to permit these men to work at top efficiency.

To prevent failures during a production shift, weaknesses must be spotted before they have a chance to give trouble. A well-organized preventive maintenance program that includes spare equipment reduces or minimizes on-shift failures. Mechanics can do a better job when they are not under pressure to get a machine back into production, and when they work on the off-shift they are not under such pressure. The need for thorough preventive checking and spare units is especially great where operation is on three shifts. However, even though all major maintenance is performed off-shift in section or main shops, and even though spare production units are available, it is necessary to have a few trouble shooters on the job during working hours.

Operators who know their business are a major method of keeping machines running, since such operators can spot trouble before it happens and also will not precipitate breakdowns by abusing their equipment.

Oil is one of the main things that makes machines possible, and providing high-quality lubrication is of fundamental importance in reducing breakdowns. Among the steps that help are specially designed lubricating trucks, centralized lubricating systems and good oil seals.

Accurate records on machine operation, breakdowns and their causes, plus reports on things that need to be done to prevent breakdowns, are necessary methods of keeping on the beam. New materials and methods that are stronger and resist wear and abrasion also cut breakdowns, prevent production losses and cut maintenance cost.

8. "Motor Burnouts"

LOW VOLTAGE is the major culprit in motor burnouts. Scarcely less important are continued overloading and faulty lubrication, the latter resulting in bearing wear and the armature coming down on the poles. The rule should be rated voltage at the machine terminals at all times, which also helps keep machine speed up to the designed rate. The good supervisor and his operator also will see to it that the machine is not abused by overloading. He also will take voltage readings from time to time to see that it is up to snuff.

Keep motors clean, and especially keep ventilating openings clear. Make sure that faulty lubrication doesn't result in armature drop and resultant motor destruction. But don't overlubricate and saturate the windings, with resultant decomposition of the insulation.

Potential trouble often shows up in unusual noise, vibration and odor from cooking insulation. Be alert for these warnings. Check motors at regular intervals the same as other equipment.

9. "Cable Failures"

AS WITH MOTORS, good voltage at the face can prevent a great deal of cable trouble by preventing heating as a result of excess current flow. Adequate substation capacity near the load centers, with both positive and negative conductors of the proper size, are the keys to maintaining voltage at the proper figure.

Poor splices and terminations often aggravate the problem of maintaining voltage. By recognizing limitations of cables, both physical and electrical, cable trouble can be greatly reduced. Most cables (December, 1953, *Coal Age*, p 75) fail for one or more of the following reasons: excessive tension, mechanical damage, current overload, poor splicing, and poor terminal technique.

Necking down of the cable is an indication of excessive tension, which also makes the protective covers much more susceptible to damage. Adjustment of reel tension and the use of spring-type shock absorbers at cable anchorages help prevent tension failures. Mechanical damage can be prevented to a large extent by hanging cables on hooks along the rib or in the roof. Unused cable should not be coiled or bunched, since the resultant rise in heat damages the insulation and covers. Shuttle cars should use alternate routes where possible to avoid running over cables.

If overload is suspected, look for the following: badly discolored conductors, brittle or very soft conductors, and blisters between protective sheaths and cores. Overload preventive measures include not only rated voltage and elimination of cable coiling, but also adequate fuse or circuit-breaker protection.

Temporary splices should be replaced with permanent vulcanized splices as soon as possible. No matter how well a temporary splice is made, the electrical efficiency of the cable is decreased. Never cut out the ground wire in making a splice. You sacrifice safety when you do.

10. "Getting Along With the Union"

LIVING UP TO the letter of the contract has been a cardinal principle of old-timers in the business in getting along with the union. Another principle cited by a number of men experienced in dealing with the union is to be positive rather than negative in the approach. For instance, these men recommend that whether the pit committee, local officials or national officials are concerned, it is good policy to go to them with specific requests for help in attaining what should be the common goal of both parties—better jobs and better income for both the miner and

company. If, for example, safety slackness is evident, there is every good reason why the company should present a request for assistance to the pit committee and local union officials. The same goes for other matters affecting both parties.

"Shortsightedness" and an apparent desire to "cut the company's throat" are among the charges laid against union men, and there is no question but that there is some truth in them some of the time. But basically, as noted previously, union and management have a common goal, and operating from that goal should help cut down the area of disagreement when questions come up.

There is no sure cure for union trouble, since union men are working for the union and have their aims too. Sometimes, they have a problem of relations with the men that they depend upon for office—or think they have—and are likely to put out demands or take stands for member consumption rather than because they really mean them. One key to getting along is ability to determine when the union means business and when it is just talking.

In any event, union men are union representatives, and whether they may seem to be right or wrong they should be dealt with on that basis—fairly, courteously—and firmly as necessary—with no bypassing. Trying to knock a union man down, tempting though it may be at times, can get a management man a reputation for being hostile, and consequently the union men are likely to adopt a similar attitude.

It helps, as previously noted, to go to the union with matters where they can help—and to enlist the union's cooperation in safety drives, in supporting celebrations to increase management-worker solidarity, and in other directions where joint effort will redound to the credit of both sides and accomplish meritorious objectives. Working together fosters getting along together, especially when a conscientious effort is made to provide the union with facts about industry progress and company plans and problems.

None of this means that management need abdicate its responsibilities. It still must be management if progress is to be made. But if it makes a real effort to keep union men posted on facts, including, perhaps, citing a few appropriate articles in *Coal Age* for off-hours reading, the necessity for wrestling with "shortsightedness" and "throat-cutting" may be sharply reduced. And if the local union and the district officials, after being apprised of the facts, could take steps to help cut mine cost and thus permit an order to be held, the game would seem to be worth the candle.

11. "Effective Supervision"

DEPENDING UPON THE LEVEL of management they represent, *Coal Age* readers find two things as difficulties in attaining effective, efficient supervision. Top management is concerned with the quality and effectiveness of mine supervisors, and mine supervisors also are concerned with their standing in the managerial hierarchy and with methods of improving their proficiency as bosses. Thus, one group cites "low-powered foremen," and the other such things as "no management backing."

Starting with the "low-powered foreman," was he low-powered when he was put on the job as a result of failure to check thoroughly on his abilities and potentialities? Or did he become low-powered because he had to fight obstacles that he should have not been called upon to cope with, such as bad power, poor supply service, failure to back him up in disciplinary measures, lack of information on what was going on or being planned, and so on? Or maybe he is low-powered because of lack of training which he might readily absorb with profit to himself and the company. Of course, there is always the possibility that while he is not the man for one job, he could do well with another.

The process of raising the level of supervisory efficiency starts with careful selection. Then follows clear outline of duties, setting of goals and top-management backing, plus, of course, good equipment, good working conditions and continued indoctrination in company policies and plans. The idea is to prescribe responsibility, outline what it is and encourage the man to go on from there. Going on from there naturally involves making it possible for him to take steps to improve his supervisory proficiency. Provide an opportunity for them to discuss problems and suggestions with their fellow supervisors, with representatives of top management, and with people from outside the company. Encourage a thoughtful approach to the job by asking for and giving serious consideration to questions. Encourage and provide opportunity for training either under company or outside sponsorship. Give credit when credit is due, and especially go very thoroughly into the situation when performance does not come up to par. The latter is one of the best ways of finding and eliminating difficulties.

Above all, treat foremen as management men, and especially make certain that every opportunity is taken to give foremen stature with their men. Work with and through them, with no bypassing or failure to back them up. Provide the privileges and prerequisites that go with being a boss, as well as the men and the tools they need to do their job.

In the important field of effectuating company policy, the foreman it a key man, and whether or not company policy gets acted upon and understood depends to a considerable extent on how well the foremen are posted. Be sure, first, that you understand the policy and then be sure that you pass it on promptly and thoroughly, not neglecting the reasons, the goals, what changes it will mean, and what benefits it will bring to both the supervisor and his men, as well as the company. Leave plenty of room for questions and discussion. In fact, it is quite likely to be even more profitable if the foremen are brought in when policy is being developed, especially if it involves them and their men.

12. "Knowing Where the Boss Stands"

THIS IS A PRESENT PROBLEM of a number of down-the-line supervisors, according to the returns from the *Coal Age* survey. It is reflected in such comments as "no management backing" and "difficulty in telling what the superintendent wants."

When a faceboss feels that management doesn't back him up, he is likely to conclude that top management either doesn't mean what it says or doesn't say what it means, and that he is caught in the middle and his position is weakened. The truth is, every rule should have a good reason. And if that is the case, it ought to be enforced. And if a foreman enforces it, he ought to be backed up.

It all goes back to delegating responsibility and then taking all the steps that such delegation necessitates. In other words, every level of management shares responsibility for getting things done, including getting good discipline. And what is good discipline. One executive's definition is: "Discipline in industry should be such as

not to disturb the healthy, friendly relationship between supervisors and workers but stringent enough to secure strict compliance with orders and policy regardless of their level of origin." That puts rules-making and discipline in a nutshell.

If a man has a clear and definite idea of what he is to do, he is much more likely to do it right and feel better in the process. That is at the root of the problem good direction and instruction, the lack of which is a supervisory headache. Some hints on this are:

1. Take a look at the instruction or requirements. Do you make clear what you want and when? Have you anticipated obstacles and objections?

2. Take time to do a good job of explaining. Give the man time to discuss and ask questions. Provide what the man needs to carry out the order. Set a time for completion.

3. Check up from time to time. Perhaps you overestimated the ease or difficulty of the job, or the man may have run into unforeseen difficulties.

4. Be prepared to make changes in program and deadline if necessary.

13. "Better Roof Support"

ADEQUATE KNOWLEDGE of the physical characteristics of the roof and adoption of methods and standards that provide satisfactory support are essential elements in controlling roof. And how well the roof is controlled governs to a large extent the success or failure of a mine, aside from its effect on injuries and fatalities. The most modern equipment is of little value if it can't be used effectively. As machinery becomes more nearly automatic and more expensive, and as labor costs rise, the need for positive roof control becomes more imperative. Even after the coal has been extracted there remains the problem of keeping haulage roads and air courses in safe, usable condition.

Strict adherence to a standard procedure, whether it be with roof-bolting or conventional timbering, is perhaps the most important step in preventing accidents from roof falls. The folly of setting timbers or installing roof bolts irregularly on the basis of judgment is proved by the number of accidents occurring in areas where the roof was judged to be good. Adequate timbering as the mine is developed often will prevent the need for retimbering or reinforcing in the future.

Retimbering haulways driven before roof-bolting was introduced can be made easier by application of tools that eliminate human effort in raising timbers or by replacing timbers with roof bolts.

Successful roof control in longwall mining depends upon knowledge of the structural properties of the strata above and below the coal, movements of these induced by mining, effects of the strata movement on strata themselves and the method of roof support. Improved supports that combine high load-bearing capacity with controlled yield characteristics have made possible better results in longwall operations.

Since successful pillar extraction depends upon how completely they are recovered, efforts should be directed to reach that goal. Multiple-shift operation, steel and wood roof bolts in conjunction with conventional timbering and uniform width for working places are helpful in getting good pillar recovery.

The possibility of coating roof with an airtight material or conditioning air should not be overlooked where roof disintegrates when in contact with air in permanent openings.

14. "Promoting Safety"

PROMOTING SAFETY must start with dedication in the top office. It continues and flourishes if there's dedication all the way down. It brings everybody in—officials, miners, the union, wives, children, neighbors, newspaper and radio people, merchants, school teachers and preachers. It boosts safety not only on the job but also at home, at school and on the streets and highways. It uses all communication channels—short safety meetings for small groups before the shift or at the face; big community safety rallies with contests, prizes and food for all; foremen's conferences on weekends and idle days; safety training; posters; mailing pieces; pay-envelope stuffers; company publications; personal letters from the company president or superintendent; films about safety from the Bureau of Mines; do-and-don't or right-way-wrong-way photographs on calendars, blotters or newspaper pages; and any other devices ingenuity can discover.

Some companies promote safety with prizes offered for safety suggestions. Others honor the men who set new safety records. Some, taking the friendly approach, have found union officials, local and district, glad to join in safety promotion—and helpful, too. Still others have made gains by putting new equipment and machines on display and pointing out their safety features before putting them to work in the mine.

Safety promotion also involves maintaining safe equipment and working conditions—good ventilation, sprinkling, rock-dusting, guards, permissible equipment, fire-fighting facilities, well-maintained equipment, clearances, good lighting, and so on. A system of safety inspection and having all men report hazardous conditions are logical methods of making sure that physical plant and equipment are kept up to snuff.

15. "Educating Workers in Safety First"

LONG EXPERIENCE has shown that personal interest and conviction are the foundation of safety. In other words, a man who is conscious of the need for safety, is convinced of its benefits to him and is trained in accident prevention, is a man who works safely and wants things safe around him.

Training is the key, as the results now being attained in certain coal fields well attest (December, 1953, *Coal Age*, p 70). This training takes in men and officials 100% and, briefly, comes down to intensive teamwork involving companies and miners, the union and Bureau of Mines instructors; competent teachers with long experience in coal mining; graphic teaching aids and close-at-home case histories; class participation in demonstration and discussion; pressure from all sides to get the men out 100%; provision for suitable classroom space; carefully planned sessions, with each meeting pointed to a single theme or problem, such as roof control, haulage, blasting, barricading, cleaning-plant hazards, strip-pit dangers and so on; and finally, a goal to shoot for—100% training and a resultant decrease in accidents.

Among other things, such training and consequent development of safety consciousness, materially eases the problem of getting compliance with safety laws and regulations, since everyone now understands that such laws and regulations have a meaning. And conversely, it could lead to a climate and a cooperative spirit that would go far toward eliminating or modifying unrealistic and unduly burdensome laws and regulations.

16. "Supply Handling"

AS THE COST of supplies and labor required to handle them increase, it becomes increasingly important that supplies be used wisely. It is false economy to make a general reduction in the quantity of materials issued from the supply house. Much more can be gained by careful distribution. Accurate records of supplies used and close control over issuing of supplies are among the more effective ways of preventing waste.

Standardization of pumps, motors and types of mining equipment will permit reduction of inventory. One spare part thus can serve a number of units. Paper work required to keep records up to date also will be greatly reduced.

Workers can be made conscious of the cost of supplies by a display of common supply items with the cost of each attached. The men who use the supplies—mechanics and machine operators—are more able than anyone to make supplies last longer and prevent waste.

Special timber cars that permit timbers to be handled easily or in palletized units, preassembled roof bolts and special lubrication cars, all are tools that help reduce supply handling costs.

Supply cost can be cut by application of long-lived materials such as stainless steel, high-strength alloys, plastics, abrasion-resisting tile and other ceramic linings, special insulation materials and treated timbers. Water neutralizing units are effective in increasing life of materials where acid water is used in preparation plants.

17. "How to Train"

THE GOAL in training is of course improvement of the company position by making miners or management or both more proficient. Perhaps the first consideration in setting up a training plan is making sure that the men who take it get something definite out of it, such as the following: job stability, security for the family, a better job, higher pay, standing among fellow workers, more recognition by superiors, a chance to excel others and a better knowledge of how to protect himself from the hazards of the job. If you can keep their self-interest before your prospective trainees, you will have solved one of your toughest problems—the support and participation of workers.

Training is more than formal courses. In fact, it goes on all the time in informal, on-the-job instruction by all men in management ranks. Since this is the situation, every attempt should be made to capitalize on it. In other words, consciously decide to miss no opportunity to provide training by careful, thorough explanation, demonstration, and follow-up. For more formal training, the following are essential:

1. Subject matter—Tailor it to the needs of your men, even if you have to break them up into advanced and starter groups. With miners, some may have to begin with simple arithmetic. Others may be able to go right into electricity. Still others may need only a couple of sessions to catch up on new machines. Above all, keep the subject matter practical. That is, relate it to coal mining.

2. Materials and aids—These aren't hard to find and they needn't be fancy or complex. For instance, you probably can pick up a junction box or a hydraulic pump around the shop for classroom demonstration. A mine map from the engineer's office also can be helpful. In short, nothing else takes the place of real, familiar objects to bring teaching down to earth.

If you want to go further in using teaching helps, plenty of materials, including textbooks, films, study outlines, diagrams and demonstration kits, are available from state and federal vocational-training agencies, the U. S. Bureau of Mines and various state mining departments, correspondence schools and equipment manufacturers. Some cost a little money and some are free, but most of them are helpful.

3. Instructors—Your instructor can make or break your training program. He should be the kind of man whom workers respect because he knows his subject and whom they understand because he speaks their language. With rare exceptions, that means your instructor should be an experienced mining man. In addition, he should be patient, enthusiastic, earnest and gifted with a sense of humor.

4. Plans—Every session of every course should be carefully planned in advance. That is, the instructor should know what he expects to accomplish at each session and how he expects to accomplish it—whether by lecture, demonstration, question-and-answer techniques, open discussion or a combination of several or all. But guard against trying to teach too much at a single session. Too much will confuse your men, not help them.

5. Time and place—Classes should begin promptly and end on schedule. The classroom should be clean, well lighted, comfortable and conveniently located for your men.

18. "Getting Quality Coal"

MAXIMUM IMPURITY REMOVAL, accurate sizing and uniformity are the hallmarks of a quality coal. Methods and equipment for attaining these goals were the subject of a special "Preparation Guidebook" in the preceding, or March, 1954, issue of *Coal Age*.

19. "What's Ahead in Coal Markets"

IT'S NOT EASY to sell coal today. Demand is down and competition is still strong, with natural gas offering more and more trouble. But does this mean that coal is due for an even deeper slump or—stretching things to the utmost—is headed for the ditch at last? The evidence warrants an emphatic "No." Demand may drop off even more in some categories for a time, and may stay down for quite a while in some. But, as pointed out in the editorial on p 69 of this issue, it is difficult to see how any market can be knocked out of existence anytime in the near future, and in at least two the only way is up in the future. In addition, significant new markets can very well arise.

So, times may be difficult but coal has basic strength on which to capitalize. Modern merchandising engineering service can help and the industry is moving to extend and strengthen its efforts in this direction.

Merchandising and service are not the entire answers, and the over-all job of building requires the efforts not only of the sales staff but also of the men at the mines. A salesman is thrice-armed when he has quality and a price that is based on the minimum in cost.

Summing up, coal has problems, but it also has opportunities. Production, marketing and management men working together to achieve low cost, high quality and top-notch service to consumers can convert those opportunities into profits for themselves, for the stockholders and for the mine workers.

The 50 Biggest Mines in 1953

THE ROLE of mechanized mining and mechanical cleaning as significant factors in the industry's future is clearly evident in this tabulation of the 50 top 1953 producers prepared by J. R. Forsythe, general manager, *Keystone Coal Buyers' Manual*, a *Coal Age* affiliate. In 1953, these 50 mines collectively increased their total output by 22% over 1952, as compared with the industry as a whole which was down an estimated 3.6% in 1953. All but three of the 50 mines are equipped with cleaning plants, and two of those three are captive operations in the Far West. Of the 50 top mines, 16 are new within the last 8 yr, 18 are captive, six are strip operations and one obtains part of its output from stripping. In addition to the 50 operations listed here, there were another 26 mines, or a total of 76, which in 1953 produced 1 million tons or more, the *Keystone* study indicated.

	COMPANY	NAME OF MINE	STATE	PRODUCTION 1953	1952	1945
1.	U. S. Steel Corp.	*Robena (c)	Pa.	4,439,439	3,332,872	1,557,778[1]
2.	Clinchfield Coal Co.	*Moss (ps)	Va.	2,570,229	2,187,942	New 1947
3.	Hanna Coal Co., Div. Pitts. Consol.	Georgetown (s)	Ohio	2,428,773	2,539,835	1,942,055
4.	Peabody Coal Co.	*Peabody No. 10	Ill.	2,357,610	621,165	New 1952
5.	Peabody Coal Co.	*Peabody No. 17	Ill.	2,283,494	1,897,168	New 1949
6.	Jones & Laughlin Steel Corp.	Vesta No. 5 (c)	Pa.	2,110,915	1,790,388	1,243,827
7.	Mathies Coal Co.	Mathies (c)	Pa.	2,101,837	1,474,438	59,992[2]
8.	Peabody Coal Co.	No. 8	Ill.	2,081,025	1,713,848	1,916,322
9.	Eastern Gas & Fuel Assoc.	Federal No. 1	W. Va.	2,075,547	2,227,377	1,692,509
10.	Jones & Laughlin Steel Corp.	Vesta No. 4 (c)	Pa.	2,034,037	1,570,907	1,423,574
11.	Bethlehem Mines Corp.	*Idamay No. 44 (c)	W. Va.	1,974,688	1,452,605	New 1946
12.	Eastern Gas & Fuel Assoc.	Kopperston 1 & 2	W. Va.	1,895,866	1,888,068	1,173,915
13.	Homestead Coal Co.	*Homestead (s)	Ky.	1,862,802	1,795,487	456,337[3]
14.	Pocahontas Fuel Co., Inc.	*Itmann	W. Va.	1,797,566	1,067,320	New 1949
15.	U. S. Steel Corp.	*Lynch No. 32 (c)	Ky. E.	1,796,738	963,490	New 1951
16.	Freeman Coal Mining Corp.	*Crown	Ill.	1,642,160	953,850	New 1951
17.	Bethlehem Mines Corp.	No. 41 (c)	W. Va.	1,629,499	1,236,354	1,802,669
18.	Semet Solvay Div.	Harewood (c)	W. Va.	1,601,520	1,357,193	1,329,208[4]
19.	U. S. Steel Corp.	Gary No. 2 (c)	W. Va.	1,598,871	1,190,616	1,711,444
20.	Republic Steel Corp.	Clyde (c)	Pa.	1,596,972	1,120,770	1,050,581
21.	Inland Steel Co.	Price (c)	Ky.	1,446,901	1,165,703	1,430,000[5]
22.	Northwestern Improvement Co.	Rosebud (c) (s)	Mont.	1,421,140	1,406,321	2,555,207
23.	Buckeye Coal Co.	Nemacolin (c)	Pa.	1,392,758	819,977	2,102,678
24.	Tennessee Coal & Iron Div., U. S. Steel	*Concord (c)	Ala.	1,375,541	1,217,692	New 1947
25.	Guyan Eagle Coal Co.	Guyan 1, 3 & 4	W. Va.	1,369,578	1,363,077	838,055
26.	Chicago, Wilmington & Franklin Coal Co.	*Orient No. 3	Ill.	1,369,093	1,253,526	New 1950
27.	Truax-Traer Coal Co.	Red Ember (s)	Ill.	1,368,088	1,178,244	1,349,521
28.	Duquesne Light Co.	Warwick (c)	Pa.	1,366,789	1,215,530	861,930
29.	Christopher Coal Co., Div. Pitts. Consol.	Pursglove No. 15	W. Va.	1,365,755	1,197,000	465,770
30.	Chicago, Wilmington & Franklin Coal Co.	Orient No. 2	Ill.	1,361,739	673,881	2,991,939
31.	Pocahontas Fuel Co., Inc.	Poca. 33 & 34	W. Va.	1,341,078	1,115,125	1,243,800
32.	Compass Coal Co.	*Compass	W. Va.	1,323,393	981,375	New 1949
33.	Crucible Steel Co. of America	Crucible (c)	Pa.	1,304,709	1,046,846	1,103,011
34.	Consol. Coal (W. Va.), Div. Pitts. Consol.	No. 32	W. Va.	1,297,460	1,360,635	1,191,348
35.	Hanna Coal Co.	Bradford (s)	Ohio	1,284,055	1,281,079	343,801[6]
36.	U. S. Steel Corp.	Bridgeport (c)	Pa.	1,277,426	970,314	1,134,921
37.	Union Colliery Co.	*New Kathleen (c)	Ill.	1,276,527	942,559	New 1946
38.	Enos Coal Mining Co.	Enos (s)	Ind.	1,274,711	1,137,501	1,314,831
39.	Christopher Coal Co., Div. Pitts. Consol.	Arkwright No. 1	W. Va.	1,243,883	1,142,690	547,550[7]
40.	Eastern Coal Corp.	Stone No. 8	Ky.	1,232,000	1,203,186	1,359,059[8]
41.	Old Ben Coal Corp.	No. 9	Ill.	1,214,374	1,285,631	162,006[9]
42.	Powhatan Mining Co.	No. 1 & 2	Ohio	1,206,226	1,566,789	874,934
43.	West Kentucky Coal Co.	*Pleasant View	Ky. W.	1,206,094	1,295,320	New 1949
44.	Harmar Coal Co.	Harmar (c)	Pa.	1,175,271	1,040,316	1,053,860
45.	Enoco Collieries, Inc.	Enoco	Ind.	1,174,440	1,242,664	915,223[10]
46.	Miners Coal Co.	*Fies	Ky.	1,165,975	1,210,938	New 1949
47.	Columbia-Geneva Steel Div., U. S. Steel	Horse Canyon (c)	Utah	1,159,000	1,296,443	1,125,148
48.	Powhatan Mining Co.	No. 3	Ohio	1,152,272	1,220,971	942,142[11]
49.	Christopher Coal Co.	Osage No. 3	W. Va.	1,136,953	1,177,260	996,949
50.	Eastern Gas & Fuel Assoc.	Keystone	W. Va.	1,127,021	912,269	1,218,086
	TOTAL OUTPUT, 50 Mines			80,289,858	67,332,555	44,956,960
	U. S. TOTAL, Anthracite, Bituminous and Lignite			483,023,000	504,974,000	631,164,695

SYMBOLS: (c) Captive mines. (s) Strip mines. (ps) Part of output from striping. *New mines since 1945. [1] Ronco-Robena mine, Robena under development. [2] Pittsburgh Coal Co. [3] Deep mine, now exhausted. [4] 1944 tonnage, 1945 unavailable. [5] Wheelwright mine, now part of Price. [6] Bradford Collieries Corp. [7] Consolidation Coal Co. [8] Formerly reported as Nos. 1, 3, 4, 7, 7½, 8 & 11. [9] Mine under development, opened in 1945. [10] Knox Consolidated Coal [11] Rail & River Coal Co.

HIGH-CAPACITY EQUIPMENT handles loading and hauling in room work. Units produce up to 500 tons per shift.

BELT DRIVE INSTALLATION is prepared with ample clearance. Cutting machine shears ribs to prevent sloughing.

Freeman No. 4 Applies Modern

Effective use of all-belt haulage, special development crews, alert management and company-designed labor-saving devices among factors adding up to high efficiency at Freeman Coal's new 4,000-tpd operation.

EFFECTIVE APPLICATION of modern equipment and methods coupled with up-to-date management are keynotes at the new Freeman No. 4 mine of the Freeman Coal Mining Corp., near Marion, Williamson County, Ill. Currently producing 4,000 tpd from the Illinois No. 6 seam, the slope operation began producing coal Nov. 21, 1952. Mine development is being carried out so that a maximum output of 6,000 tpd can be produced, when needed, simply by putting additional equipment to work. The mine is served by the IC, C&EI and MP railroads.

Chairman of the board of the Freeman organization is Col. Henry Crown. President of the company is Stuart Colnon, with headquarters in Chicago, Ill. Other members of the management team at Chicago are Frank Nugent, executive vice president; Irving Crown, vice president and secretary; and Malcolm J. Proper, treasurer.

Directly in charge of the Freeman No. 4 mine is Roland Wilson, general superintendent. Assisting him are Van E. Austin, assistant general superintendent; J. M. Aiken, mining engineer; Emery Milligan, preparation manager; Guy Hargett, day-shift mine manager; and Jack Watson, second-shift mine manager.

MINING CONDITIONS

Cover over the Illinois No. 6 seam at Freeman No. 4 varies from 250 to 300 ft and averages about 275 ft. In most of the mine, the immediate roof is gray shale, but sometimes a fairly firm limestone is present over the coal. The shale is firm when first exposed to the air but slacks considerably after several months of exposure. Much better conditions are found in the limestone areas. Underlying the coal is a firm fireclay that provides a good roadbed for shuttle cars as long as it is free from water.

The coal bed averages 84 in in thickness and is free of impurities except for a ⅝-in "blue band" about 12 in from the bottom. Dip is to the northeast and the seam is gently undulating, thus lending itself readily to off-track mining equipment and belt haulage. Small quantities of methane are liberated but normal ventilation practices easily dilute the gas to harmless concentrations. No large quantities of water have been encountered and inflow is handled automatically by a system of sumps and pumps.

MINE DEVELOPMENT

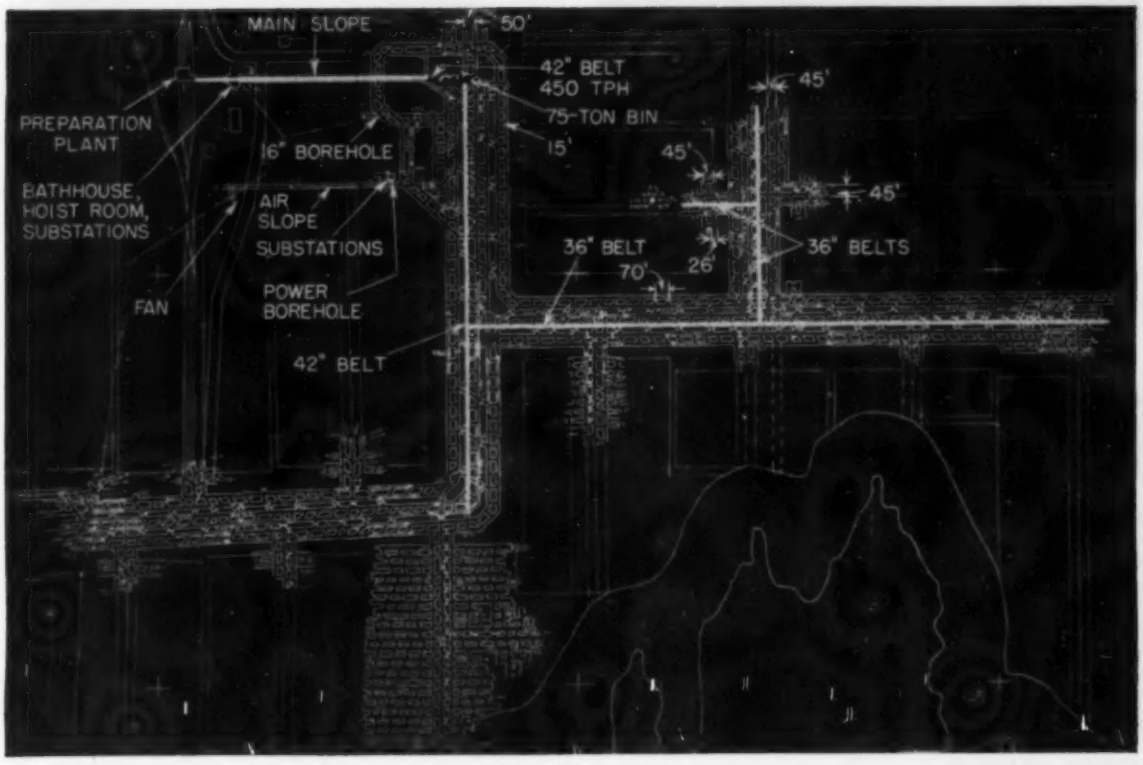
In keeping up with present-day trends in the southern Illinois field, Freeman No. 4 was developed with two slopes. The 7x17-ft main slope was driven on 16 deg and houses the main 42-in belt and the supply track. Intersecting the coal seam at a slope distance of 1,000 ft, the slope extends 150 ft downward and terminates beneath a 75-ton storage bin. To prevent water inflow and provide support, the slope was lined with concrete down to the coal and was coated with a sand-cement mixture from there to the bin. The second slope serves as a ventilation opening and emergency escapeway.

Main entries leading from the slope were driven south in a seven-heading system for a distance of 1,200 ft. Then a six-heading east main was developed 90 deg to the mains. A seventh heading was added to the east mains after they had been driven 2,400 ft. Leading from the east mains at a point 1,300 ft inby the mains is the main north belt entry. This entry was developed with six headings to a point where the first left and right room panels were turned and then a seventh heading was added.

ROOF-BOLTING CREW installs 30- to 60-in expansion-type bolts on 4-ft centers. Wood headers reduce spalling.

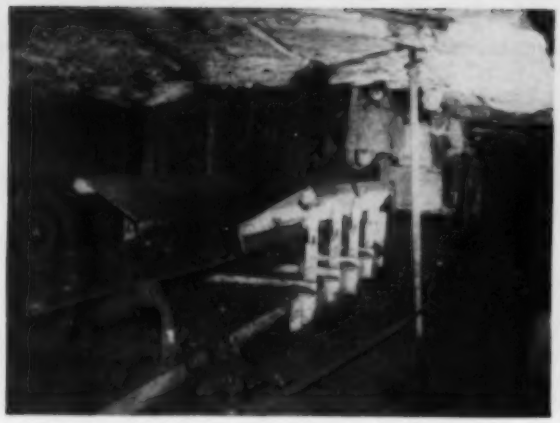
DRILLING is done with twin-boom unit. Nine holes are bored in 15-ft headings and 12 in 26-ft-wide rooms.

Methods, Plans for the Future



How Freeman No. 4 Provides for Expansion

RAPID ENTRY DEVELOPMENT to open territory for easy future expansion is the keynote in Freeman's mining plan. The all-belt haulage system is capable of handling 450 tph of output and presently is operating at about 70% capacity. Mains are developed in a seven-heading system, with panel headings necked as mains are driven to permit easy future development. Rooms are driven 310 ft deep in groups of seven off both sides of the panel headings. One side of the panel is mined advancing and the other is recovered on retreat. Pillars are not recovered.



END LOADING of belt is practiced by development crews. Rugged tailpiece was built in company shop.

TRANSFER POINT loads coal parallel to belt. Grizzly in unit permits fines to pass through and cushion lumps.

SUPPLY HANDLING underground is done on the third shift with a battery-powered tractor-trailer team.

UNDERPASS at belt intersection has plenty of clearance and good grade, permitting tractor to travel with ease.

All main headings are driven 15 ft wide on 50-ft centers. To permit faster, easier shuttle car haulage, all breakthroughs are driven 60 deg with the headings.

Room panels are driven 1,250 ft deep in a three-heading system, with headings 15 ft wide on 45-ft centers. Room panels are projected for depths of 1,000 to 1,600 ft, depending upon the mining limits. As far as practicable, they are designed for 21, 28 or 35 rooms. Rooms, 26 ft wide on 45-ft centers, are driven 90 deg with the headings in groups of seven, and pillars are not recovered.

MINING METHODS

Production units are divided into development and room crews, with each specializing in that type of work. Equipment assigned to each 11-man development crew consists of one Joy 14-BU loader, two 42-E shuttle cars, Chicago Pneumatic handheld electric coal drill, Fletcher hydraulic rotary roof-bolting unit and Jeffrey 29UC cutting machine. Each room crew is assigned a Joy 11-BU loader, two 10-SC shuttle cars, CD-26 twin-boom self-propelled hydraulic coal drill, 11-RU cutting machine and Fletcher roof-bolting unit. Handheld drill augers and roof-bolting drills are equipped with Kennametal carbide bits. Hydraulic coal drills use Coalmaster augers and bits.

Cutting machines are equipped with 9-ft bars and Carboloy CC1 carbide bits. Cutting is difficult and bits require frequent resharpening. Coal is undercut to a depth of 9 ft immediately below the "blue band" to prevent the rock from being broken into fine pieces when the coal is broken. Breaking is done with Armstrong compressed-air shells at 8,500 psi. Nine holes are required in headings and 12 in rooms.

To reduce the time required for delivering tungsten-carbide bits to the sharpening machine, and to lessen the chance of loss in transit, a bit-sharpening station has been set up underground. Located in the main east entry about 800 ft from the slope bottom, the station receives bits daily from all underground working areas. One man handles the job with a Cincinnati Tool Co. Type BO bit sharpener equipped with silicon-carbide and Carborundum grinding wheels. Advantages of this method of bit handling, Freeman management points out, are less chance for loss of bits in transit and faster return of bits to working units. Consequently, fewer bits are required.

Output from development crews averages 400 tons per shift and room crews average 500 tons. This averages out at 36.4 and 45.5 tpm on the section.

Panel entries are driven 200 ft deep and the first two rooms on each side are necked as the main entries are developed. This permits a 36-in belt to be installed readily when the panel is to be mined and provides ample working places for the mining equipment.

When a room panel is to be started, one development unit advances the three panel headings and necks rooms to a depth of 25 to 40 ft. When development has progressed far enough to permit seven rooms to be worked, a room-production crew moves in and advances the seven rooms to a depth of 310 ft. Shuttle cars in the development units discharge over the end of the belt while room cars unload over the side. After the panel has been developed to its projected depth, the development crew remains in the panel and mines rooms similarly to the room crew. When one side of the panel has been completely mined advancing and the other mined half way on retreat, the development crew moves to a new panel and the room unit completes the room work. Room and entry pillars are not recovered.

Roof is supported by 30-to 60-in Bethlehem expansion-type roof bolts installed on 4-ft centers. Bearing plates are 6x6x¾ in. When areas of friable roof are encountered, wood headers are used with the bolts to provide additional bearing area. Limestone roof usually needs no support.

BELT TRANSPORTATION

Complete belt haulage from the section to the tipple is featured at Freeman No. 4. All underground belts are 36-in Barber-Greene units powered by 60-hp 275-v Reliance motors, except the main north 42-in unit receiving coal from all producing units. The 36-in units travel at 450 fpm and the 42-in unit at 520 fpm. The main slope belt travels 320 fpm and is powered by a 200-hp 440-v AC Reliance motor. All conveyors are equipped with U. S. Rubber belting.

Bearings in conveyor idlers are lubricated systematically every 60 days by one man, who is responsible for greasing all units. In addition, one belt-maintenance man patrols all belts on working shifts to check on belt performance and carry out preventive maintenance work when necessary.

All transfer points in the belt system have company-built loading chutes that prevent spillage and provide parallel loading while cushioning lump coal with fines. Transfer chutes are designed so they can be moved to a new location in 40 to 45 min. A grizzly incorporated in the chute permits fine coal to pass through to the belt and form a cushion for the larger lumps. In addition, five sets of rubber impact idlers are installed at all points where coal is loaded on the belt to prevent damage from sharp coal or rock.

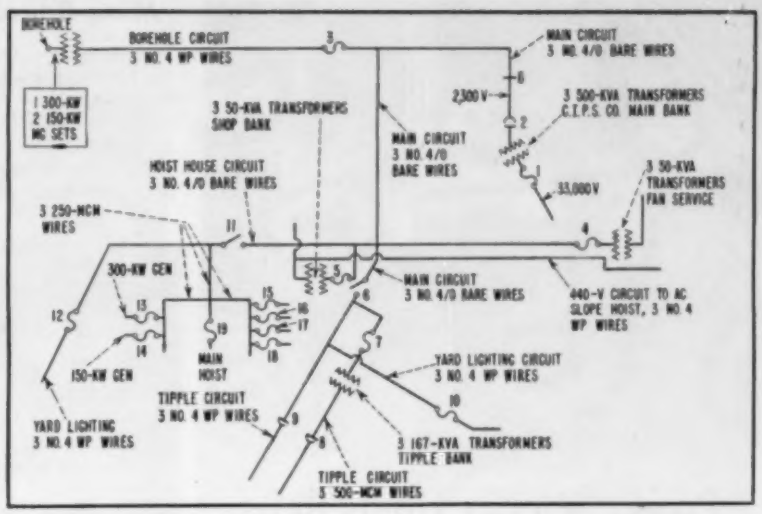
Positive belt protection against roof falls and excess spillage that might damage conveyors is provided on all belts. All units are interlocked with centrifugal switches that stop all units when one stops. In addition, thin wires connected to the belt controls are installed at strategic positions near belt heads and along belt lines. If the wire is broken by a piece of falling rock or a coal pileup, the control circuit is broken and the belt stops. It can be restarted only when the wire has been spliced.

Mine dewatering is handled automatically at Freeman No. 4 by a system of time-clock and float-switch controlled pumps and float valves on suction lines in sumps (see following pages).

Dust suppression at the face during cutting operations and all belt transfer points receives high priority at Freeman No. 4. Spray water enters the mine through a 3-in pipe-line that extends underground for 2,000 ft in the main entry. It is then reduced to 2 in for the remaining distance in the mains and is further reduced to 1 in in room panels. Sprays at belt heads are connected directly to the incoming 1-in line and operate satisfactorily under the water pressure in the line. Sprays on cutting-machine bars operate at 90 to 100 psi to get maximum dust suppression. Bars are equipped with Callahan-Short spray nozzles and water pressure is boosted at each machine by an Aurora centrifugal pump mounted on the machine chassis.

SUPPLYING THE MINE

Mine supplies are loaded in a supply car by a two-man crew on the day shift and lowered to the mainslope bottom by a Robert Holmes & Bros. single-drum 75-hp hoist equipped with a 1-in rope. Supplies are distributed underground on the third shift with Baker battery-powered tractor-trailer units. When supply roads and belt lines intersect, underpasses are constructed. These are excavated for the full width of the heading and are deep enough and



How Power Is Distributed at Freeman

PROTECTIVE EQUIPMENT is shown by numbers as follows: (1) C.I.P.S. Co. primary fused cutouts; (2) C.I.P.S. Co. secondary breaker; (3) Sweitzer & Conrad 100-amp fused cutout with 80-amp fuse links; (4) 50-amp fused cutout, 30-amp link, fan circuit; (5) 50-amp fused cutout, 50-amp link, shop transformers; (6) Westinghouse pole top switch, 3 pole, gang operated 7.5 kv, 400 amp, tipple circuits; (7) Kearney 200-amp 7.5 kv tripout fuse cutout, 125-amp fuse links, tipple-transformer bank; (8) 600-amp oil breaker, tipple circuit; (9) 400-amp oil breaker, tipple circuit; Sweitzer & Conrad 50-amp fused cutout, 2-amp links, yard lights; (10) Royal disconnect switch; 7½ kv, 400-amp, hoist house circuit; (11) 50-amp fused cutouts, 2-amp link, yard lights; (12) 200-amp LM fused cutouts, Type PHA, 500-v, 200-amp links, 300-kw m-g set; (13) 200-amp LM fused cutouts, Type PHA, 500-v, 200-amp links, 300-kw m-g set; (14) 200-amp LM fused cutouts, 5000-v, 150-amp LM fuse links, 150-kw m-g set; (15-18) 50-amp fused cutout, 50-amp fuse link, Armstrong compressors; (19) 200-amp LM fused cutout, Type PHA, 5,000-v, 200-amp LM fuse link, main hoist.

Power Winder Hauls Belts

Belt handling underground can be either a laborious tough job or an easy, mechanical operation. Soon after Freeman No. 4 was opened, a combination belt winder and transporter was designed and built in the company's shop to ease the jobs of transporting rolls of belt underground and adding or removing sections of belt.

Made of miscellaneous parts available around the mine shop, the unit is used to carry rolls of belt in or out of the mine, add belting as units are extended and especially to rewind sections on spools as belt lines are shortened. The trailer frame was made of 6-in channels welded together into a U-shape. To the frame on each side were welded pieces of 1-in sheet steel with stub axles for the two wheels. Wheels were obtained from an old 1936 model Ford truck and equipped with 10-ply 7:00x20 tires. A 1½-hp 275-v DC motor salvaged from an old reel winder on a Goodman 460 loader is mounted on top of the frame. Power is transmitted through a two-speed 20:1-ratio gear box and is transferred to the belt-winding axle by a chain and sprocket arrangement and two helical gears. A hand-operated cable spool for the power cable leading to the motor is mounted on the frame adjacent to the motor. Ends of the cable are equipped with Miller connector plugs for quick connecting and disconnecting.

The winding shaft shown in the illustration may be easily removed by pulling a pin from each bearing housing and then lifting the top half of the hinged unit similarly to the lid of a trunk. The illustration shows the housings in the raised position. Pins for connecting the housings are fastened to the frame with short chains to prevent loss when axles are changed. When the unit is used for hauling a spool of belt or adding belt to a conveyor line, the winding shaft is removed and a plain shaft is inserted in the belt spool, which is then placed on the trailer to be handled as desired.

Battery Charging Automatic

To eliminate the chance of human error and assure proper charging of batteries with a minimum of effort, Freeman management has installed an automatically controlled skid-mounted charging station underground. The unit was built by the Hertner Electrical Co., Cleveland, Ohio, and was mounted on the skid at the Freeman shop. Power to drive the 25-hp 440-v AC motor of the m-g set supplying DC current to the charger enters the mine through a borehole near the charging station.

Controls in the charging station are designed to permit batteries to be charged either to 345 or 450 amp-hr. Sufficient cable is connected to each of two outlets from the charger to permit batteries to be charged in place in the tractor or on the mine floor.

A battery-changing station is located nearby for fast changing of batteries. To charge a battery, one of the two charging cables is plugged into the battery and a control button is pushed to make contact with the timing controls. The charger continues to operate until the battery is up to full charge and then it cuts off automatically.

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long enough to permit easy movement of the supply unit or any mining equipment. Batteries for the tractor-trailer unit are Exide Ironclad and are charged at an automatically controlled skid-mounted underground charging station (see following pages).

MAINTENANCE AND SERVICE

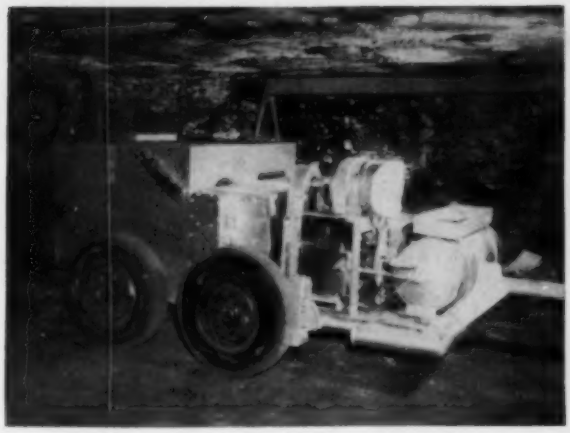
All major repair work is handled on the third shift unless there is a major breakdown on a production shift. Moving equipment to new work areas and greasing also is confined to the third shift. Emergency repairs and preventive maintenance is done on shift by four men on the first shift and three on the second. Three of the day-shift repairmen are assigned to three of the underground units while the fourth serves as a roustabout. Assignment of second-shift men depends on the location of equipment and maintenance needs.

A 13-man crew reports on the third shift to perform a variety of duties including major repairs, belt extensions, greasing, rock dusting and supplying. The entire maintenance and service program is geared to permit production crews to concentrate on coal production.

VENTILATION

Air for the mine is supplied by a two-stage double-blade Jeffrey Aerodyne Jr fan delivering 90,000 cfm at a ¾-in water gage. The fan is driven by a two-speed 60-hp 440-v AC West-

Prove Effective at Freeman No. 4



Lube Truck Speeds Job

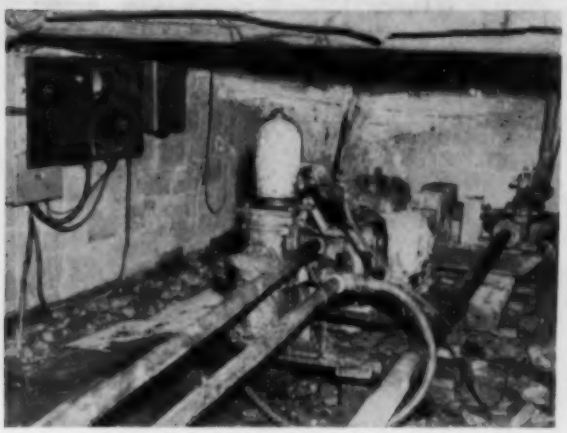
A special company-designed rubber-mounted lubrication car is management's answer to the problem of efficient handling of oils and greases underground at Freeman No. 4. Most mining men agree that transporting and dispensing oils and greases underground is at best a messy job and men at No. 4 decided to do something about it. Made of steel and mounted on four wheels, the lubrication car is pulled around the mine by a Baker tractor unit when oil and greases are to be delivered. When the unit is not in service, it is parked near the slope bottom where it can be refilled from lubricants sent down with the mine supplies. Total weight of the unit with two compartments filled is 10,750 lb.

Outstanding features of the car include special mounting on equalizer bars with coil springs for smooth riding; three separate lubricant compartments; an air compressor to furnish air for filling and emptying lubricant tanks; and a series of pressure-reducing valves that permit air to be used for filling or emptying tanks, for lubricating machinery or filling equipment tires.

It takes only 20 min to put 7 bbl of oil and grease into the compartments—that's a barrel every 2½ min.

Two rubber hoses with squeeze-type valves attached to the discharge end are used to transfer lubricants from the tanks to mine machinery. A second valve in the line leading from the tanks to the hoses permits hoses to be replaced easily with no spillage.

In addition to providing clean lubricants to machinery, two men can service equipment simultaneously, thus reducing lubricating time. Other advantages include a considerable savings in time resulting from elimination of can handling and elimination of waste from spillage.



Mine Pumping Mechanized

Mine dewatering is handled automatically at Freeman No. 4 with pumps requiring only periodic inspection and lubrication. A time-clock-controlled 4x6 Myers Bulldozer reciprocating displacement pump removes water from a series of small sumps and delivers it via a 2-in line to a main sump.

The small gathering sumps are cut into the bottom with a universal cutting machine when water is encountered as the mine is developed. If inflow continues after mining has advanced, a suction line is left in the sump and dewatering continues automatically. The end of each suction line left in a sump is fitted with a float valve that closes the line tightly when the sump is empty. If more than one sump contains water, the one nearest the pump will be emptied first; then the next nearest, and so on, until all sumps are empty. At present, the gathering pump operates 4 hr, then is idle 8.

The main sump was made by building a dam across the mouth of an offset in a heading and is readily accessible for inspection. A centrifugal pump powered by a 20-hp 440-v 1,900-rpm AC motor is controlled entirely by a float switch in the dam. Water is delivered to the surface through a 2-in pipe line installed in a 3-in borehole. A tar-covered conduit installed in the borehole beside the discharge line delivers AC power to the pump room. Mine management feels confident that this present pumping setup will be useful for the life of the mine.

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inghouse induction motor. An auxiliary LeRoi Model D471W7 automatically controlled gasoline-engine standby unit goes into operation if the fan speed drops below normal. Controls for the fan drives were supplied by the Trumbull Electric Mfg. Co. and General Electric.

Air enters the mine via the main haulage slope and is directed to the three middle headings of the seven-heading main entry. The main 42-in belt is installed in the No. 4 heading

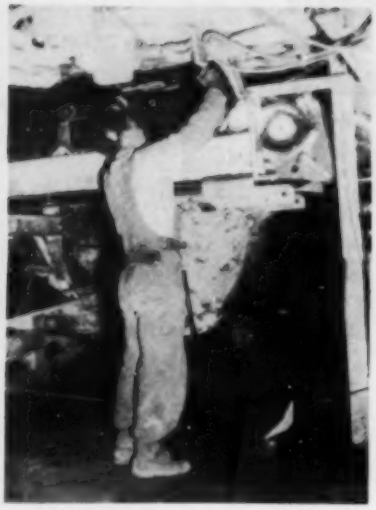
MORE MINE-TESTED "Operating Ideas" appear in this issue, on pages 88-89, 90-91, 112, 114 and 116-117.

and is on a separate split. Thus the two remaining intakes supply fresh air for the working faces. Two outside headings on each side of the three intakes serve as returns. Concrete-block stoppings are built between Headings 3 and 4 and temporary wood stoppings between 4 and 5 erected during development are left in to provide the belt split. The main air current is divided into two splits, one of which includes the main east entry and north main off main east. The second split ventilates the main west entry.

POWER

Power is delivered to the property by the Central Illinois Public Service Co. at 33,000 v and is stepped down

MAIN SLOPE BELT delivers coal directly to tipple at 320 fpm.



PREVENTIVE MAINTENANCE and inspection keep belts in top condition.

UNDERGROUND sharpening speeds return of bits to section, cuts losses.

ALL-STEEL MAN-TRIP CAR delivers men to slope bottom in groups of 24. Unit is lowered by supply hoist.

COMPRESSED AIR for breaking coal at 8,500 psi is supplied by a battery of four surface units.

to 2,300 v by a bank of three 500-kva transformers. From these, power is transmitted to circuits supplying power to DC units underground, tipple, hoist, shop, fan and yard lighting.

Underground 275-v DC power is provided by five m-g sets located on the surface. Three of the units are over the air slope and deliver power through a borehole to the mine. These consist of two 150-kw and one 300-kw General Electric sets. One General Electric 300-kw unit and one Westinghouse 150-kw set are located at the main belt slope. Power from these stations enters the mine via the slope entry.

Two 1,000,000 cir mil positive and a like number of negative feeders lead from the substations to the mine. Feeders are suspended from the mine roof and one 500,000 positive and negative set is installed for each loading unit. Thus a section having two complete loading units would have two 500,000 positive feeders and two 500,000 negative returns.

PREPARATION

Raw coal is delivered to the Freeman No. 4 tipple where it is hand-picked and crushed for shipment to the Freeburn No. 3 preparation plant or sized and loaded as unwashed coal. Three men hand-pick the coal before it is broken to 4x0 by a Jeffrey single-roll crusher powered by a 75-hp 440-v Allis-Chalmers motor.

When shipped to the Freeburn No. 3 plant, it is mixed with coal from the Freeman No. 3 mine and upgraded by wet and dry cleaning methods. Plus 6-in lump is hand-picked and minus 6 in is separated into 6x1½ and 1½x0 products before passing to the wet and dry washing units. The coarse product is cleaned in a Hydro-Separator and the 1½x0 is separated into 1½x¾, ¾x⅞ and ⅞x0 on Allis-Chalmers Ripl-Flo vibrators with heated screen cloth. Each of these products then passes to a Roberts & Schaefer Super Air-Flow table for cleaning.

After it is hand-picked, the plus 6 in lump is delivered to a McClanahan & Stone crusher and reduced to 6x0. This product is separated into plus 1½- and minus 1½-in fractions and cleaned by the wet and dry units. Facilities also are included in the plant to crush all clean plus 1½-in coal to 1½x0 if desired.

For All Progressive Coal Men . . .

1954 Coal Convention

American Mining Congress, May 3-5, Netherlands Plaza Hotel, Cincinnati

Monday Morning, May 3

Coal's Future—Mine Safety

What's Ahead for Coal?—Eugene Ayres, Gulf Research & Development Co.

The Federal Coal Mine Safety Board of Review, A Panel Discussion by the Board Members—Edward Steidle, Chairman; Edwin R. Price; Charles B. Ferguson; Troy L. Back, Executive Secretary; and John S. Forsyth, General Counsel.

Monday Afternoon, May 3

Roof Support

Rotary Drilling in Sand Rock for Roof Bolting—J. K. Berry, Clinchfield Coal Corp.

Pneumatic Drilling for Roof Bolting—Martin Valeri, Buckeye Coal Co.

Yielding-Member Steel-Ring Roof Supports—C. S. Kuebler, Lehigh Navigation Coal Co.

Pillar Extraction, Methods, Results, Recovery—George L. Judy, Consolidation Coal Co. (W. Va.).

Strip Mining

Truck Haulage Problems, Engines, Tires, Roads—Andrew Hyslop, Hanna Coal Co.

Anthracite Stripping in Burning Areas—John W. Davies, Shenn-Penn Production Co.

Auger Mining on High Walls—Kenneth O. Shaner, Widnoon Co., and D. A. Zegeer, Consolidation Coal Co. (Ky.).

Tuesday Morning, May 4

Mechanical Mining

Symposium on Face-Preparation Methods—In Thick Seams, D. C. Howe, Jones & Laughlin Steel Corp.; **In Pitching Veins,** Robert Yourston, Union Pacific Coal Co.

Symposium on Efficiency of Large vs Small Crews for Mechanical Mining—Henry W. Bauer, West Virginia Coal & Coke Corp.; Joe Craggs, Peabody Coal Co.; and G. S. Jenkins, Clarkson Mfg. Co.

Coal Preparation

Effect of Future Markets on Coal Preparation—J. B. Morrow, Alford, Morrow & Associates.

Coal Preparation at Midwest Radiant Co.—I. V. Curtis, Midwest Radiant Co.

Heavy Media Cleaning—A. E. Sadler and J. W. Forman, Pocahontas Fuel Co., Inc.; and D. C. Snyder, Mt. Hope Coal Co.

Development in Feldspar Jigging—Dr. H. F. Yancey, U. S. Bureau of Mines.

Tuesday Afternoon, May 4

Haulage

Underground Belt-Coneyor Maintenance—R. U. Jackson, Hewitt-Robins, Inc.

Shuttle-Car Haulage to Mine Cars—Thurman C. Harris Jr., Ingle Coal Corp.

Shuttle-Car Belt Loading in Thin Seams—C. H. Williams, Red Jacket Coal Corp.

Extensible Belt Conveyor for Continuous Mining—W. J. Shields, Rochester & Pittsburgh Coal Co.

Strip Mining

Bigger Returns From Larger Stripping Equipment—Thomas M. Ware, International Minerals & Chemical Corp.

Recent Information on Blasting Vibrations—Jules E. Jenkins, Vibration Measurement Engineers.

Strip Mine Haulage—R. H. Uhl, W. G. Duncan Coal. Co.

Wednesday Morning, May 5

Maintenance and Power

Maintenance Organization and Practices at Hudson Coal Co.—Donald Smith, Hudson Coal Co.

Underground Installation of High Voltage Cables—John A. Dunn, Island Creek Coal Co.; and T. R. Weichel, Hazard Wire Works Div., The Okonite Co.

Mine Illumination, The BCR Underground Experiments—Gerald Von Stroh, Bituminous Coal Research, Inc.

Coal Preparation

Reject Disposal by Truck, Pumping and Belt Conveying—W. A. Weimer, Northern Illinois Coal Corp.

Utilization and Recovery of Washery Wastes—C. E. Howard, Truax Traer Coal Co.

Recent Developments in Eliminating Stream Pollution—Henry F. Hebley, Pittsburgh Consolidation Coal Co.

Wednesday Afternoon, May 5

Continuous Mining

Symposium on Continuous-Mining Operations—Goodman Miner, J. W. McDonald, Old Ben Coal Corp.; **Jeffrey Colmol,** E. M. Pace, Inland Steel Co.; **Joy Continuous Miner,** Richard Graham, Saginaw Dock & Terminal Co.; **Konnerth Mining Machine,** Ralph C. Beerbower, Jr., U. S. Steel Corp.; **Lee-Norse Miner,** C. B. Tillson Jr., Crucible Steel Co. of America; **Marietta Miner,** F. R. Zachar, Christopher Coal Co.

Two Years' Experience in Longface Mining—W. D. Hawley, Eastern Gas & Fuel Associates; and Richard T. Todhunter, Barnes & Tucker Co.

Special Events

Monday Luncheon—Guest Speaker to be announced.

Monday Evening—Coal Miners' Party, Coney Island Amusement Park.

Tuesday Luncheon—Guest Speaker, Walker L. Cisler, The Detroit Edison Co., on "Atomic Energy and Its Industrial Applications."

Tuesday Evening—"Baseball Night," Cincinnati Reds vs New York Giants.

Wednesday Evening—Annual Banquet, featuring special entertainment.

WINDOWLESS DESIGN cut first cost and future maintenance of 4,000-tpd Hendrix plant. Building height was planned to utilize gravity flow, reducing equipment investment. Raw coal is automatically dumped from 25-ton mine cars into the 400-ton bin at left. Stoker sizes are loaded from the bins at the right.

Consol's "Clean" Cleaning Plant Anticipates "Tomorrow's" Design

By J. H. EDWARDS
Associate Editor, COAL AGE

WHAT DO YOU SHOOT FOR when you sit down to draw specifications for the best possible preparation plant you can build or to plan revisions in your present preparation facilities?

"The best plant possible" was the objective of the management of the Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., in the design of the plant now turning out 4,000 tons of clean coal per 3-shift day at Hendrix mine, Deane, Letcher County, Ky. Here were management's primary goals, each rated equally:

1. Operation and maintenance with the very smallest crew practicable.

2. Installation of several equipment units in duplicate to reduce the possibilities of shutdown.

3. Operation of the cleanest plant in the country.

4. Establishment of maximum safety for personnel.

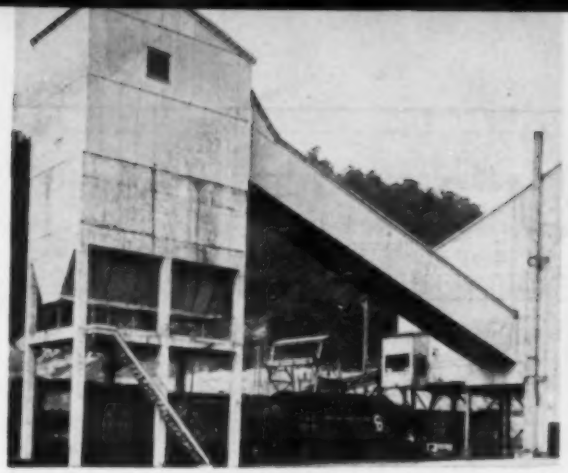
5. Assurance of efficient preparation methods and results.

As may be seen from the description following, Consol went far beyond the ordinary. It turned these goals into practical operating realities by careful pre-planning, effective selection and placement of equipment, wide utilization of automatic controls and a determined effort to eliminate the usual bugs in plant operation and maintenance. By any standards, the Hendrix plant is more than "the plant of today." It comes close to being "the plant of tomorrow."

At Hendrix, output of 200 tons of clean coal per man-shift is truly a net figure. Three men per shift inside the plant and three more outside operate the plant and handle all the maintenance, including dumphouse attention, handling railroad cars and refuse disposal. Cleanliness is outstanding—so much so that a visitor can go through the plant in street clothes and come out clean.

EXPERIENCE FACTOR IN DESIGN

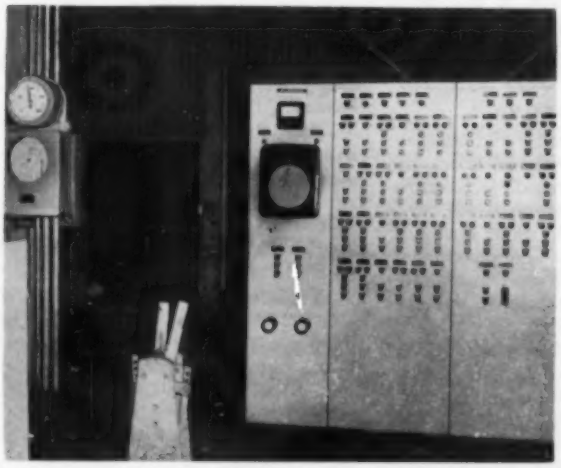
Roberts & Schaefer Co. designed the plant to general specifications set up by the coal company officials after numerous conferences of top management with the coal company preparation and maintenance engineers. Members of Consol's staff have worked out many improvements in the Jenkins central plant (*Coal Age*, April 1943, p 65), which represented the "last word" when it was built in 1942, and have had considerable experience in designing, operating and maintaining



LOADED-CAR CONTROL STATION projects from building behind stoker-belt gallery. All car moving, boom handling and stoker loading is push-button controlled.

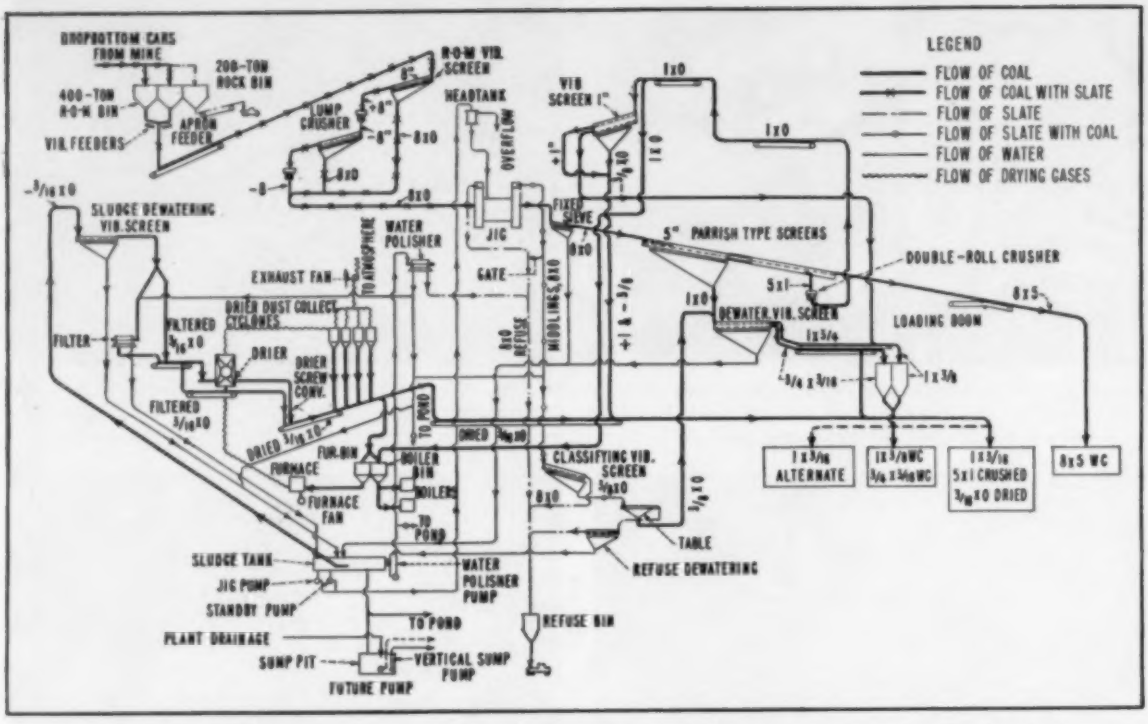
MAJOR EQUIPMENT WAS POSITIONED to provide gravity flow where possible and facilitate maintenance. Building view shows furnace, drier and cyclone collectors.

RAW COAL from 400-ton bin is fed by two opposed 250-tph vibrators (one shown, left photo) to a 36-in 275-ft belt elevating to top of plant. R-O-M belt discharge is at right, with motor, V-belt and gear-reducer drive, and magnet.



PART OF CONTROL CENTER AT jig. Raw-coal feed in tons per hour, as measured by R-O-M belt scale, is shown on dial (left) and noted on chart for permanent record.

TWIN BELTS elevate stoker sizes to loading bins, with drums for each automatically adding Consol trademark tags to the coal at a rate of 2,500 to 3,000 per 50-ton car.



EFFICIENT PREPARATION is one of several goals featured in flowsheet of Consol's Hendrix plant.

other cleaning plants over the years. Every attempt was made in the Hendrix design to capitalize on all this knowledge.

The Hendrix plant, served by both the C. & O. and L. & N. railroads, crushes to 8 in, washes the entire input in a Simon-Carves jig, concentrates the fine middlings on a wet table, heat dries the 3/16-inx0 and loads four sizes on three tracks. Both mine and plant operate three shifts.

Although the Elkhorn No. 3 seam being processed (averaging 42-in thick) is very clean and in most places has a strong slate top, reject from the preparation plant runs about 11% of the raw feed and consists largely of an occasional top scale and material from a soft bottom. Quality of the "Consol Cavalier" produced is shown by the following analysis of the washed R-O-M product:

Ash	2.7 to 3.2%
Sulphur	0.6 to 0.9%
Carbon	56 to 58%
Volatile	37 to 39%
Surface moisture	3.0 to 4.0%
Btu (dry)	14,600 to 14,800

ARTIFICIAL LIGHT EFFECTIVE

Having heard before visiting the plant that it had no windows, your *Coal Age* editor charged with preparing this report expected an interior with a gloomy aspect. Later, he was surprised that he had completely forgotten to note the absence of windows as he toured the inside. Placing of the industrial-type fluorescent lighting fixtures was so skillfully done and so much light was supplied that there are no dark corners, as is usual when daylight is depended upon and not enough artificial lighting is installed or is not all turned on at once. Eliminating windows reduced the building's first cost and cut its future maintenance. The fluorescent lighting does an excellent job even if the lamp tubes and reflectors are not often cleaned and lamp renewals are less frequent than was expected.

INSIDE HOSED DAILY

The building, of steel and concrete construction, with concrete floors, has roof and sides covered with corrugated Transite. Floors have curbs around the walls and floor openings, with drainage holes and pipe downspouts arranged so that the entire interior can be hosed down, which is done once a day.

After the plant design was settled and the contract awarded, Roberts & Schaefer offered to make the entire structure either all-concrete or all-steel at the same price. The coal company choose a middle ground, using concrete extensively where there was an advantage and little possibility of structural change.

PARTITIONS CONFINE DUST

Steam jets or water sprays, or both, are utilized where dust is raised by coal transfers, discharges, crushing, screening, etc. The interior of the building is compartmented by a number of tight partitions of Transite running up to the ceilings. The partitions prevent the spread of possible dust and greatly reduce noise throughout the plant.

GRAVITY CUTS EQUIPMENT

The building was designed as a high structure so as to take every advantage of gravity, thus reducing the number of conveyors required. Basically, the refuse drops by gravity to a 200-ton rock bin from which it is hauled away by truck. To provide for entrance of a second raw-coal conveyor for future development of large coal reserves on the opposite side of the hollow, an offset was designed into the top of the building.

Ventilation of the building is provided by louvers in the walls near the bottom and at other necessary locations, together with five exhaust fans in the roof. In summer, the building is cooler than anticipated and the operating crew seldom turns on all the ventilating fans.

Absence of windows makes the building easier to heat. Steam equipment for supplying low-pressure unit

Here are some of the design and performance factors Consol of Ky. put into its Hendrix plant:

Preparation of 4,000 tons of clean coal per 3-shift day with 20 men, three inside and three outside, per shift.

Cleanliness enhanced by daily hosing of plant interior, with dust confined and allayed at source.

Better-than-natural lighting in windowless plant by ample fluorescent lighting.

Utilization of duplicate equipment, gravity flow and automatic controls to reduce investment and operating costs, cut maintenance and down time.

heaters, dust allaying and heating oil for coal treatment, consists of two duplicate Farrar & Tufts boilers with Iron Fireman stokers. Both boilers are operated in cold weather, but only one is used the remainder of the year. In effect, this adds up to a spare boiler but reduces the size of both, as each is rated a little over half the peak load.

Provision is made for an emergency supply of control air in case of failure of the normal supply to the drier control. The piping systems are tied in so that the air pressure of the Simon-Carves jig control can be utilized to operate the drier controls.

DUPLICATES PREVENT DELAYS

Jig circulating pumps, which are made by Barrett-Haentjens, are installed in duplicate with one serving as a spare.

Another example of duplicate equipment for insuring continuity and the utilization of gravity to reduce investment, quantity of machinery and subsequent maintenance, is in the oil supply for dustless treatment. Three 8,000-gal storage tanks, 1,000 ft from the plant, were placed at an elevation that permits both transfer from railroad cars to storage tanks and flow to the plant to be handled by gravity. Duplicate lines are installed to the plant and the system is equipped with valves so that the feed can be taken from any one of the three tanks and the oil taken to the plant through either one, or both, of the lines.

The oil-spray equipment (Viking) is in a fireproof concrete and concrete-block room inside the plant, located at ground level on the empty-track side adjacent to the rock bin. The only door to the room opens to the outside. Normally, the oil is steam-heated but in case of steam failure, electric heating takes over. Permatreat, supplied by the Ashland Oil & Refining Co., is used.

The oil-spray room also houses extra lubricants for the plant. Greasing is simplified because anti-friction bearings were specified throughout, except for a very few special applications. Where plain bearings are used, they are automatically lubricated from Farval equipment installed in the same room.

PARTS HANDLING PLANNED

A Quonset building for storage of bulk materials and heavy repair parts is located near the tanks and is served by the same railroad spur track. The building has a floor and outside platforms so that either trucks or railroad cars can be loaded or unloaded at floor level. A ramp from the ground to floor level permits the use of a high-lift or crane inside the building when desired. All this saves much labor.

In designing the plant, the Bird centrifugal filters were positioned near the outside walls so that their heavy parts can be lowered to the ground from overhead I-beams, which extend above railroad tracks where trucks also can travel. The two filters are at opposite sides of the building.

On the downstream side of the plant there are five service doors, aligned vertically at convenient levels, with an I-beam at the top equipped with an electric hoist.

WIRING FAILURES AVOIDED

Profiting by experience of others with wiring failures in conduit buried in concrete, the coal company specified that all electrical conduit in the Hendrix plant must not only be exposed but also must have watertight couplings, pull boxes and fittings. Thus, there is no possibility of moisture entering, despite the daily hosing of the entire plant, and the conduit arrangement also helps maintenance.

Stainless-steel screens are used throughout the plant, except for the round-hole plates of the main screens, which are plain steel.

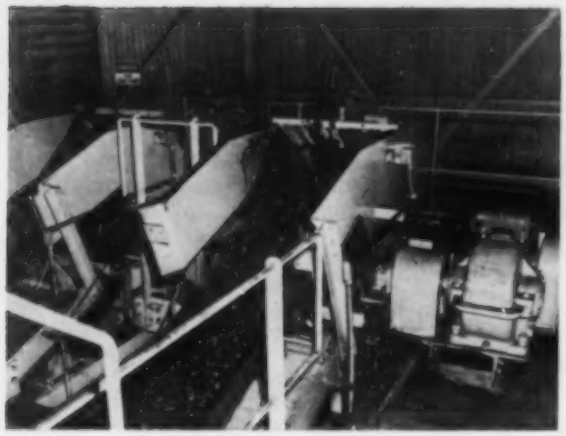
COLOR BOOSTS PLANT SAFETY

Safety and good housekeeping inside and outside the plant are enhanced by "color dynamics" painting in conformity with recommendations of the National Safety Council and paint manufacturers. Motors and controls are painted blue. Alert orange is used on interiors of switch boxes, around the edges of belt guards and at emergency stop buttons. High-visibility yellow covers the hand rails and also is used, with black stripes, on first and last risers and steps of stairs and at points where headroom is restricted. Structural members are a basic gray, with a lighter gray on conveyors and running units. Fire extinguishers are red and doors are green. No black paint is permitted, except in the black-and-yellow striping mentioned.

To insure an adequate water supply for the washer, six wells were drilled, any one of which will supply all the water necessary. One well is right inside the plant so that there is no absolute dependence on incoming buried water lines. Four wells have been equipped with pumps and all are vented to dissipate the small quantity of explosive gas liberated.

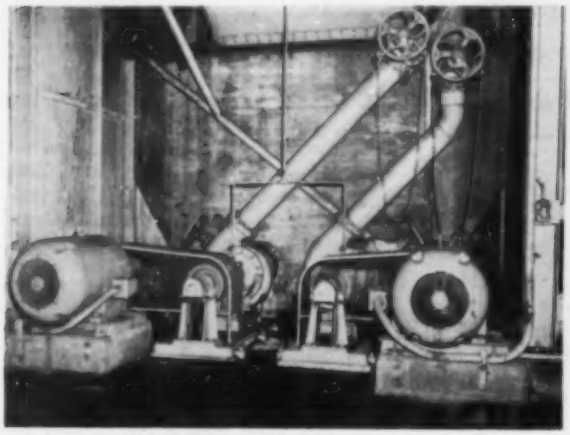
A Quonset building covering the dumphouse proved inexpensive to construct and offers a maintenance and safety advantage, in that it provides few places for dust to collect.

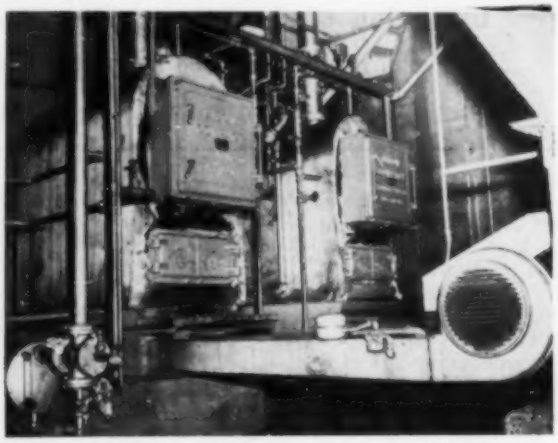
Many of the foregoing plant features tie in with the very small number of men required for its operation and maintenance. Certain other indicating, remote-control and construction features installed to aid the operators are brought out in the brief description of the coal-handling and preparation equipment following.



OIL SPRAYS at discharges above stoker bins are actuated by coal flow. Cover protects drive and bins from mist.

ALL PLANT REFUSE and mine rock are handled by one man operating a bulldozer and this 15-ton truck.





DUPLICATE EQUIPMENT to guard against plant shutdown includes jig pumps, with one serving as a spare. Both automatic, half-peak-capacity steam boilers (right) are used in cold weather, but most of the year one acts as a spare unit.

COAL FLOW AUTOMATIC

Trips of 25-ton dropbottom cars loaded automatically from belts at the various mine openings (*Coal Age*, August 1953, p 99) dump automatically into a 400-ton concrete bin. Two Jeffrey-Traylor vibrating feeders in opposed positions deliver this raw coal to a 275-ft-long Link-Belt elevating conveyor carrying a 36-in Goodyear belt. Flow rate of the raw coal, as measured by a Merrick Weightometer installed on the belt, is indicated in tons per hour by a dial and is recorded permanently on a chart. Both chart and dial are on the main control board on the jig floor. The dial is of help to the plant operator in achieving an even feed and in forewarning him of more slate in the feed. Equally useful, the chart shows every start and stop, records the rate of feed and permits pencil notations, thus forming a permanent record of the operation.

BOARD CONTROLS FEED

Feeder rates up to 250 tph for each feeder are adjusted remotely at the same control board. Both feeders are used when coal is available from the respective areas of the 400-ton bin, to help blending. High and empty coal levels in the bin area above each feeder are indicated at the control board.

Prohibitively large slabs of slate contacting wings near the discharge end of the raw-coal belt stop the flow. The wings also stop the belt in case of a pileup of coal for any reason. A rectangular Dings electromagnet over the discharge removes tramp iron. The raw-coal belt control is so interlocked that it cannot operate unless the magnet is energized. In addition, should the belt slip, stall or break, the motor would be stopped by a centrifugal switch operating on the underside of the belt.

EFFICIENT COAL PREPARATION: CRUSHING, SCREENING FILTERING, DRYING THREE-TRACK LOADING

Two Link-Belt Type CA vibrating screens and two McLanahan & Stone crushers prepare the 8x0-in feed. Plus 8-in material from the first screen, after crushing to minus 8-in, again is screened to 8 in. Any resulting oversize then is crushed to 5 in to reduce the chance of any flats larger than 8 in going into the jig.

From the Link-Belt Simon-Carves 6-cell jig, the clean coal passes onto a Roberts & Schaefer Parrish-type classifying screen. Refuse from the jig drops directly into the refuse bin. Middlings pass onto a 4x8-ft Type CA vibrator from which the 8x⅜ goes directly to refuse and the ⅜x0 to a Deister Concentrator Co. SuperDuty table. The ⅜x0 clean coal joins the 1x0 from the classifying screens and

ONLY WINDOWS in plant are in loaded-car control station.

TAG DISPENSER is simply a rotating drum with slots, actuated by coal flow.

moves to a Hewitt-Robins double-deck Eliptex dewatering vibrator.

A 4x16-ft single-deck Eliptex vibrator removes the water and fine clay particles in the 3/16x0 that flows from a sludge tank accumulating the 3/16x0 from the clean-coal dewatering vibrator and from a fixed sieve in the flow between the jig and Parrish screens. Clean water then is added to the 3/16x0 as it passes to a Bird centrifugal filter.

Drying of the filtered product is done in a 12x24-ft Link-Belt Multi-Louvre heat drier supplied with flue gas from an Economy furnace with Combustion Engineering Firite spreader-type stokers. Controls are so arranged that only occasional checking is necessary and a heat-drier attendant is not required.

Water from a table-refuse dewatering screen, together with water pulled from a choice of five levels in the sludge tank, is cleaned of clay particles and other fine solids in a Bird centrifugal water polisher. Part of the effluent supplies dilution water ahead of the Bird filter and the remainder returns to the sludge tank. Locating the Bird polisher directly over the refuse bin permits dropping the sticky, clayey concentrate directly into the other refuse, thus avoiding use of conveyors, an important advantage.

Lump, 8x5-in, from the washed-coal screen moves directly onto a loading boom. The 5x1-in drops into a McNally-Pittsburg double-roll crusher for reduction to minus 1-in to be sized for stoker coal. Sizes customarily loaded by the plant are shown on the flowsheet. Each of the three loading tracks is equipped with a Brownie hoist installed beside the track. They are set on a skid base permitting pivoting to a limited degree and are anchored to foundation uprights by compression springs that absorb the shock of the direct pull (see p 116).

STOKER OIL-TREATED

Oil treating of stoker sizes to suppress dust is handled at the upper end of the two belts which elevate stoker sizes to loading bins located separately from the plant. The bins are entirely hooded so that the oil-spray mist is totally confined to the coal-bin portion of the structure and does not get on the conveyor drive or plant structure.

Calcium chloride to prevent freezing during cold weather is applied at the lower end of the belts. Also at the lower end and above each belt is a dispenser which drops "Consol Cavalier" identification tags of thin aluminum into the stoker coals at a rate of 2,500 to 3,000 per 50-ton car. Paddles contacted by the coal flow on the belts automatically control the tag dispensers and the application of oil and calcium chloride.

Principal motors in the plant are General Electric and are fan-cooled and totally enclosed. Controls were furnished by Westinghouse. All motors, controls and conduit can be hosed, except the plant operator's control board and the main control units. The latter are in a separate, dusttight room, although this feature seems superfluous since there is no dust.

Refuse from the washing-plant bin and a mine-rock bin at the mine-car dumphouse is hauled by one 15-ton Euclid end-dump truck.

Maintenance of the plant is facilitated by a number of 440-v power outlets for electric welding machines. The portable Lincoln units are rated at 300 amp.

20 MEN FOR 3-SHIFT OPERATION

An operating crew is composed of: 1 control and jig operator; 1 loaded-car control man; 2 railroad-car cleaners and handlers; 1 combination refuse-truck driver and bulldozer operator; and 1 utility man. The total is 18 workmen per 3-shift day. A general foreman, on the job during the day shift, and another foreman who divides his time between the other two shifts, brings the total force to 20 men. No other men are engaged in dumping, operation of the plant, maintenance or refuse disposal for the 4,000-ton output, except during periods of intense sampling when an additional man per shift may be added.

OPERATING CREW TRAINED IN MAINTENANCE AND REPAIR

All men are trained in maintenance work as well as in operation. If a breakdown occurs, the control-and-jig operator blows a whistle signal to call the crew, including the outside men, to his station for instructions. All men pitch in on advance maintenance work or cleaning the plant whenever waiting on coal.

Maintenance tools and certain spare parts, available at several locations in the plant, speed a repair job. Often a minor repair is completed before mechanics could get started if they were to be dispatched from a mine shop or central shop. Furthermore, the wages of the plant crew are not being wasted during down time. Major repair jobs, similarly, are handled by the plant operating force. When the work force was originally selected, an effort was made to hire men already trained as mechanics, electricians and welders, or men with an aptitude toward such work who could be trained. This policy applies even to the car handlers.

A spotlessly clean, tile-lined toilet is provided for on-the-job comfort. It is furnished with a urinal, commode, wash basin, soap, paper towels and hot water. However, the plant men use the regular mine bathhouse for shift-end showers and changing clothes. No outside shanties or small buildings for car droppers, etc., are allowed. Instead, those men are provided with a warm, dry place inside the plant for their raincoats and extra clothes.

Although the plant requires only three inside men to operate, plans for making it into a one-man operation have been under study for some time. In addition to the normal automatic devices, such a step might also require one or more applications of wired television.

FULL-CIRCLE STEEL RINGS, which yield uniformly under load, provide support through 150-ft of "squeeze" area in one of Coaldale's main haulage tunnels.

Supporting a Tunnel With Yielding Steel Rings

PROBLEM:

How to reduce the high cost of maintaining support in a section of an important haulage tunnel which must be kept in service for at least another 15 yr . . .

SOLUTION:

Replace wood timbers with full-circle yielding steel rings to reestablish equilibrium throughout the squeezing section of the tunnel

By CHARLES S. KUEBLER,
Assistant Mining Engineer
Lehigh Navigation Coal Co., Lansford, Pa.

SQUEEZING ACTION in a 150-ft section of one of our main haulage tunnels threatened to close the tunnel in spite of all physical and financial investments we had made in tunnel maintenance through constant retimbering. Our latest attack on the problem has been the installation of full-circle yielding steel-ring support.

Our company officials, working with engineers of the U. S. Bureau of Mines Anthracite Research Laboratory, Schuylkill Haven, Pa., and Walter L. Herold, president, Herold Mfg. Co., Inc., Scranton, Pa., finally chose the Glockenprofil (bell-shaped in cross section) support rings manufactured by Bergbaustahl, Westphalia, Germany. The rings were purchased through the Herold company, with Mr. Herold supervising the installation.

The first ring was placed June 11, 1953, and the 75th and final ring on Oct. 12, 1953. The performance of the rings has been gratifying, and we hope this will continue to be the case since our forward planning shows a need for the tunnel for at least the next 15 yr.

Each ring essentially consists of four segments which are bolted together in a manner that permits the joints to telescope or yield under load, thus permitting a decrease in ring diameter, without distortion, until equilibrium is reestablished. The circular support offers an infinite number of compression points upon which the ground pressures may act; yield-

ing in the ring occurs when the load is from 25 to 30 tons.

BAD TUNNEL CONDITIONS

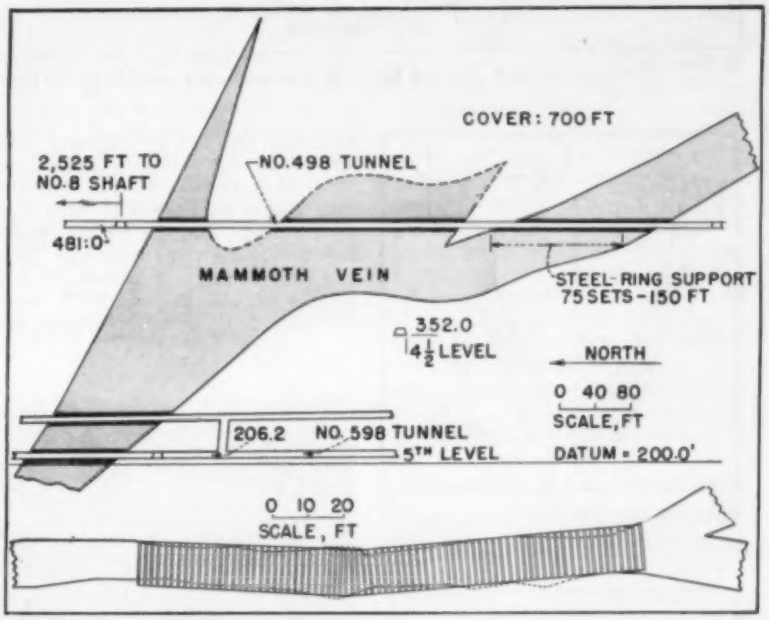
The section in question is at the south end of Tunnel No. 498 which serves the 4th level at Coaldale colliery. In this area, the tunnel is driven through a fold of the Mammoth vein which spans a distance of 590 ft from top rock to bottom rock. This extensive fold in the vein is broken by only two small rock folds at the elevation of the tunnel. Coal produced in the workings off the south end of the tunnel is hauled through the tunnel to No. 8 Shaft.

The tunnel is driven through a pillar 165 ft wide at the 4th level, and the support pillar at Levels 4½ and 5 is 220 ft wide. It is believed the squeeze began when chutes were worked adjacent to the support pillars on the lower levels in 1946, since there had been no trouble throughout the prior 14-year life of the tunnel. Afterwards, even though the chutes were stopped, pressure on the tunnel continued in the section between the bottom rock of the vein and the first rock fold to the north.

As conditions worsened, it became necessary to invest more and more maintenance labor to keep this main haulage artery open, with the result that for some time prior to the installation of the yielding rings, a night-shift crew of from 10 to 14 timbermen and four trackmen were employed for this purpose. The original timbers, consisting of 10-ft collars and 8-ft legs set on 5-ft centers, were replaced time after time and new sets were added until timbers were in most cases 1 ft or less apart. A minimum diameter of 18 in was specified for this timber.

Furthermore, the bottom had heaved until the track in some places was as much as 2 ft above original grade, and the ground pressure had displaced the tunnel laterally until several pronounced curves appeared in the originally straight opening. These are the adverse conditions it is felt will be corrected by the yielding steel supports.

BEFORE steel rings were installed, misplaced track, heaved bottom and crushed timbers were characteristic of the squeezing section.



SECTION AND PLAN show where yielding rings support Tunnel No. 498. Effects of the squeeze on the originally straight tunnel show up in plan.

YIELDING-RING DESIGN FEATURES

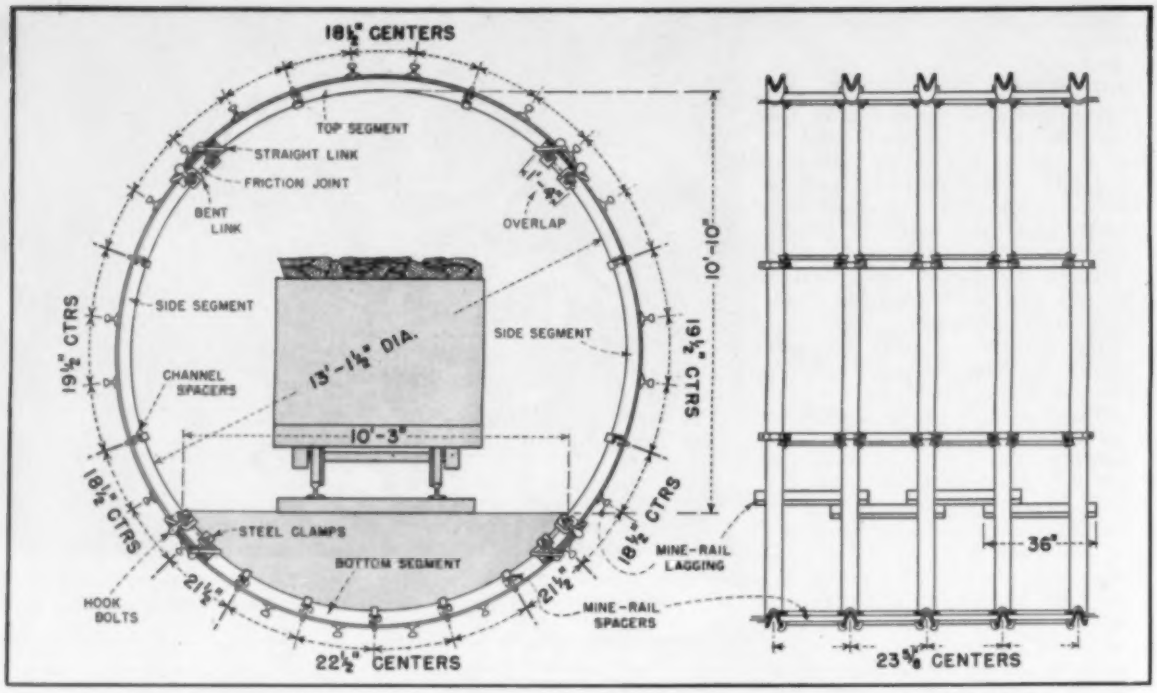
Each ring consists of four segments, 11½ ft long on the arc, which form a ring about 13 ft in diameter and 41 ft in circumference. The rings overlap 1 ft 4 in at the four joints, providing room for the bolt-and-clamp arrangement which holds the circle together.

The bolts are tightened to a torque value of 220 ft-lb, a value which permits the joint to yield through sliding action when the load on the ring is from 25 to 30 tons. Two specially-designed links at each joint keep the bolt-and-clamp assembly in proper position as sliding takes place. The sliding at the joints continues until the ring yields sufficiently to restore static equilibrium between the load on the ring and the clamping restraint.

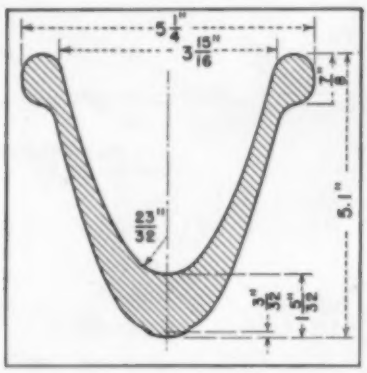
The bell-shaped cross section of the segments is designed to permit the segments to nest one within the other at the joints. The proportions are such that segments of different weights may be included in one ring. In this Coaldale application, for example, the bottom segments weigh 20 lb per ft and the top and side segments weight 17½ lb per ft.

INSTALLING THE SUPPORTS

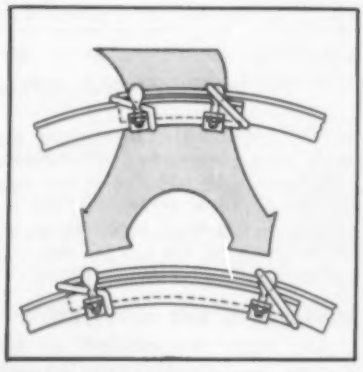
The rings are installed on 2-ft centers, the spacing between the rings being maintained through the use of channel-section spacers, two at



TELESCOPING JOINTS between ring segments provide for uniform yield without ring distortion.



BELL-SHAPED RINGS (cross section) are designed to nest within each other.

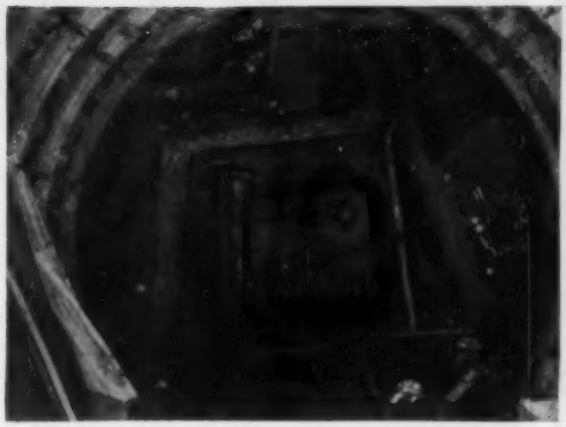


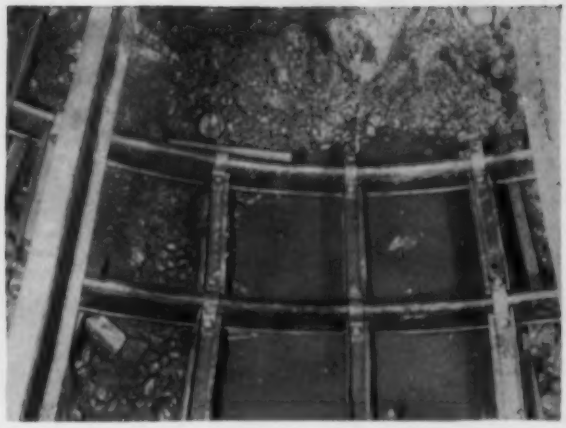
SPECIAL HOOKS keep bolts in position as joints yield under load.

each side and two at the top. Five spacers for the bottom segments are made of 60-lb rail. Bottom segments and spacers are heavier to resist acid mine water. The spacers are rigidly fastened to the rings with hook bolts and clamps. Lagging is made of 3-ft lengths of old 40- and 60-lb mine rail placed 18 in apart around the perimeter of the rings to support the broken material in the tunnel walls.

The first four rings were carefully installed to insure the best possible start with respect to alignment and grade. It was recognized that the rigidity resulting from the use of 11 spacers between rings would not permit later adjustment of the rings. The

CONCRETE PIER at intersection of east-west turnouts and south end of tunnel shows effects of tremendous ground pressure resulting from squeeze.





ROOM FOR TWO MORE RINGS is made by stripping out top, bottom and ribs, and blocking back the face. Bottom segments (right) are laid without removing track, then rings are completed and lagged with steel rail and tunnel rock.

rings are installed at right angles to a grade line which had been established as the first order of business. Therefore, the bottom segment of each ring leads the top segment by a distance of 1¾ in. No attempt was made to place the rings in a straight line throughout the 150-ft section of the tunnel since that would have interfered with transportation. The kinks in the tunnel, which resulted from the action of the squeeze, were followed by shortening spacers between the 30th and 33rd, 42nd and 43rd and 60th and 61st rings.

The working force for the job was made up of four 3-man shifts on idle days and two 3-man shifts on operating days. The sequence was four shifts for trimming to a 16-ft all-around clearance and forepoling the top and sides of the tunnel to receive two rings, two shifts for digging out the bottom, and two shifts for installing the rings and for lagging and packing. Normal advance was six rings in 20 shifts, with 10 tons of material removed for each ring installed. In digging out the bottom, a sump was prepared to keep water below the working level.

Costs were necessarily high because the job was hazardous and the safety of the workmen took precedence over all other considerations. Furthermore, it was necessary to restore transportation before production shifts when work was done on operating days.

TEMPORARY WOOD SUPPORTS for trolley wire at north end of job indicate by their slightly-bowed condition that some rings already have yielded.

CHECKING THE INSTALLATION

Soon after the rings were installed it was evident they had assumed loads induced by the ground pressures. The original torque (220 ft-lb, as mentioned) changed somewhat, and it was necessary to readjust to this value shortly after installation was completed. This initial settlement, however, appeared to result in better nesting at the joints, making further adjustment unnecessary in most instances.

It is important that the clamps be tightened only up to the proper torque. If they are too tight the sliding action will be prevented, and the circular rings will be distorted under load. The rings are assisted into proper seating by striking them with a hammer near the joints, a procedure which is done periodically. Some of the joints yielded from 2 to 4 in.

The yielding of the rings indicates that a condition of comparative equilibrium has been established. So far, the rings have done an excellent job.

Follow-up study of the installation, a project of our mining-engineering department, includes (1) measuring the horizontal diameter of the rings, (2) measuring the distance between the bolts of each friction clamp on each ring to determine reduction of circumference and (3) taking elevations at the bottom of the top segment of each ring. Every third ring is examined in this manner each month, thus providing data for each ring at 3-mo intervals.

The rings may yield to a diameter of 10 ft without interfering with haulage, and to a diameter of 7 ft 4 in before the segments finally meet to prevent further yield.

1. Good Facilities. Underground shop at Mathies handles complete rebuilding of all mining equipment. Completely overhauled loader, getting final check (right), was first stripped to frame in special work area.

Three Keys in Making Maintenance Pay

2. Machine Specialists. All maintenance men specialize in one type of machine, like these rebuilding shuttle-car (left). Locomotive overhaul (right) is a big job at Mathies, with 37 units ranging from 8 to 50 tons.

3. Ample Parts and Good Records. Adjacent supplyroom serves all needs of underground shop. Good cost records and a complete file of maintenance manuals are kept in Mike Rocco's underground office (right).

Maintenance-Mindedness Works For Pittsburgh Coal

How a leading Pennsylvania producer organizes for effective maintenance and encourages the participation and ideas of all employees.

How the program pays off, with specific examples of successful mine-developed ideas.

By A. E. FLOWERS
Associate Editor, COAL AGE

TAKING FULL ADVANTAGE of knowledge and ideas gathered from all employees from the president on down, venturing to use new methods and materials, utilizing manpower where its skills are most beneficial, and supplying workers with the facilities to do first-class work—that's how Pittsburgh Coal Co. and its affiliate, Mathies Coal Co., get better-than-average maintenance. Some of the positive benefits are more productive time for underground loading units while keeping maintenance costs at a low figure, longer life for preparation-plant units and easier and faster preparation-plant maintenance.

Getting these results springs from the basic philosophy of the top management team, which emphasizes giving individuals freedom of expression and a voice in shaping maintenance methods. Pittsburgh Coal Co. is headed by Henry C. Rose, president. Other members of the top management group are: T. G. Ferguson, vice president; J. E. Norton, assistant to the president; H. K. Yontz, treasurer; C. M. Hays, chief mining engineer; V. D. Hanson, chief mechanical engineer; A. B. Cunningham, electrical engineer; J. M. Vonfeld, preparation manager; and S. K. Hissom and A. E. Vandale, division superintendents.

The Mathies top management group includes G. A. Shoemaker, president; D. H. Davis, vice president; G. A. Kratz, secretary; and H. K. Yontz, treasurer. Included in the operating team at the mine are: R. D. Lauder, superintendent; Michael Rocco, master mechanic; M. F. Florjancic, mine foreman; and D. G. Werner, preparation foreman.

Top management impresses upon each mine superintendent and his staff the importance of that particular mine in the financial success of the company. Each superintendent thus operates his mine aware that success or failure of the company depends upon how well he does his job. The central organization, with offices in Library, Pa., acts as a service center for all the mines, and all individuals headquartering there and all of their skills are looked upon as tools to aid the men producing coal. As a result of this type of basic philosophy among top management, there is in the organization a spirit of self-sufficiency, with the desire to find new and better ways of improving costs and products.

Top management delegates responsibility and authority and requires line personnel to consult with top management only when company policy is involved. Thus men are encouraged to use their own initiative to develop new methods. While mine superintendents, preparation foremen, project engineers and the like function primarily as individuals in their various assignments, top management keeps in close contact with their individual problems.

For example, T. G. Ferguson, vice president, goes underground almost every day to see things first hand and check on the needs of the particular mine visited. V. D. Hanson, chief mechanical engineer, spends part of the week underground checking on production, maintenance and mechanical problems. He spends the remainder in the field checking various surface projects and on office work. Mine superintendents are mining and production men and check on underground operations and conditions daily. Division superintendents constantly are consulting with superintendents at their mine to render service wherever possible.

UNDERGROUND METHODS

Maintaining 30 loading machines of various types, 28 cutting machines, 37 locomotives varying in size from 8 to 50 tons, 29 shuttle cars, 18 drills and 12 hydraulic roof-bolting units—that's the job assigned to Mike Rocco, master mechanic at Mathies mine. Keeping 22 complete loading units in good operating condition at a 3-shift operation is a tough assignment, no matter how you look at it. Mathies currently is producing 9,900 tons of clean coal per day, or 13,200 tons of raw coal. Evidence of a sound maintenance program is the fact that these 22 units are kept operating with the help of only five section trouble shooters per production shift. A number of factors contribute to the success of the underground maintenance program. These are:

1. Good Maintenance Facilities—To provide workers with facilities for complete overhaul of all underground equipment, a complete underground shop was installed at Mathies. Facilities include lathes, drill presses, overhead cranes, motor pits, electrical testing equipment and other auxiliary equipment to do a complete job. The shop is subdivided into sections by concrete-block walls, and each is well illuminated by fluorescent lights. Incorporated in the shop is a supply house stocked with all the parts and materials needed for any type of job.

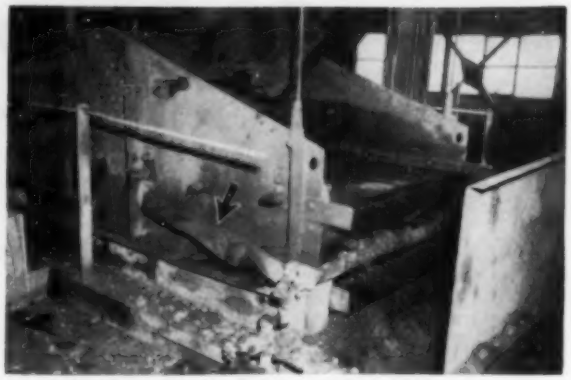
Each subdivision of the shop is reserved for a specific type of overhaul job. Thus loading machines, shuttle cars and so on are each repaired in their respective places.

Top management feels that maintenance men must be given ample working space if they are to do a first-class job. They have provided the shop for that purpose and, as a result, the shop has become the heart of the maintenance program. Complete overhaul jobs are scheduled according to the needs of the various types of units, but practically all machines are rebuilt once every 12 mo. Thus work required on the section is minimized.

At all times there is a loader, shuttle car and locomotive in the shop. It takes about three weeks for a machine to undergo a complete rebuild.

2. Maintenance Specialists—To take full advantage of the skills of each maintenance man, the company classifies each man according to the type work he can do and then assigns him to those jobs he can perform best. This policy has resulted in a maintenance crew that is made up of

Here Are Some of the Maintenance Ideas



1. Supports Add to Screen Life, Reduce Rope Replacement

Adding support to screen cloth on vibrators has increased screen life at the Mathies plant by reducing movement which had caused cracking. Screens are given additional support by two steel-rods located midway between the side and center supports. To hold the screens firmly in place, they are secured to the rod supports with J bolts. Benefits of the additional support were noted mostly on refuse dewatering and desanding screens.

Replacement of a wire-rope-and-coil-spring side support on a vibrating screen with a rubber-connected support (right) also has paid off. A piece of rubber, 2½ ft by 2x4 in, with one end bolted to the vibrator and the other to the outside supporting frame, has eliminated the cost of periodically replacing wire ropes.

2. Conveyor Pileup Avoided

To prevent large pieces of coal or rock from fouling belt or scraper conveyors, limit switches have been installed to stop the conveyor units when an overload is present. The switches also will stop the conveyors if a chain or belt breaks, thus preventing pileups and possible conveyor damage. Any sudden overload that suddenly increases conveyor tension will operate the switches.

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specialists in shuttle cars, locomotives, loading machines and so on. These experts can dismantle and rebuild a machine in their special classes much faster than an all-round man. As an example of the specialist program, one man is classified as an electrical inspector with the job of continuously checking equipment for permissibility.

Another method used at Mathies to provide effective maintenance is a centrally located underground parts shanty equipped with a phone. One of the trouble shooters headquarters at the shanty and can dispatch parts to a section if a piece of equipment fails during the production shift.

Greasing is handled on the third shift by two-man teams equipped with track-mounted grease cars. One car serves the No. 9 face entry, where eight loading units work; another supplies the No. 11 face entry, where another eight units work; and a third car is assigned to the No. 13 face entry, where four units are located. In addition to performing all greasing duties, these crews deliver oil to each working section.

A complete file of service manuals, wiring diagrams, and parts catalogs is kept in the shop supply room. From time to time, the company designs special parts for various equipment and a complete file of blueprints of these is kept with the other information. Special catalogs and bulletins on various types of machinery and supplies are kept on file in Mike Rocco's surface office.

Maintenance records are kept for each piece of equipment. Included in the record are such items as last date of repair, parts used and labor required for the job. Thus it is possible to determine the life of cutterbars, cutter chains, locomotive trucks, trailing cables and so on.

3. Ample Spare Equipment—Spare equipment in top operating condition is available for service when producing units show serious signs of wear. Trouble-shooters keep a close check on all producing units and when any machine approaches a condition where it might fail and thereby curtail production, it is replaced with a spare. Spares are located where they can be delivered to a section in a matter of a few minutes.

All maintenance at Mathies is performed by a crew of 54 men, in-

Developed at Pittsburgh Coal Properties

3. Precut Plates 50% Faster

A 50% reduction in the time required to replace wearing plates in conveyors was achieved by replacing welded sections with precut pieces bolted in place. Plates are prepared with ⅝-in holes and countersunk to receive ⅝-in bolts. When a plate is to be replaced, the four bolts are cut out, the plate removed and a new precut and drilled section is dropped in place and bolted securely. This method is much faster and simpler than cutting out the worn section with a torch, cutting a new piece to fit the hole and then welding it in place.

A significant benefit from using the bolted plates is that small leaks appear around bolts when the plate section is nearing failure. This warning enables maintenance men to have a replacement ready for installation before there is a breakdown with ensuing damage to the conveyor. Sizes of plates are not standardized for all conveyors and chutes but are designed to permit easy handling in the working space available at the conveyor or chute. Once a plate size has been selected for a unit, all replacements are made the same size.

4. Thruster Saves Refuse Gate

Another typical example of applying ideas to reduce maintenance costs is a thruster device that holds the door on a slate hopper open while rock is discharged into the slate bucket of an aerial tram. The unit is interlocked and timed with a feeder delivering refuse to the slate hopper that discharges into the tram buckets. It holds the door up until the hopper is emptied into the bucket and the bucket has moved past the door. The door then is released to close by gravity. As the next bucket moves under the hopper it trips the trigger holding the door, releasing a bucketload of slate.

Before the thruster was installed, the door was left to swing freely and, as a result, there was considerable damage done to it by hitting the slate buckets. Slate buckets also suffered damage from constant pounding.

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cluding the master mechanic. These men are classified as follows:

Men Each Shift			Job Classification
1st	2nd	3rd	
2	2	1	Locomotive
3	3	..	Loaders
2	2	..	Shuttle cars
1	2	..	Cutting machines
3	..	..	Unit and part repair
1	..	..	Rebuild hydraulic pumps
1	..	..	Lathe operator
1	..	..	Cutterbar repairman
2	2	2	Trouble shooters, 8 units
2	2	2	Trouble shooters, 8 units
1	1	1	Trouble shooters, 4 units
..	..	6	Greasers
1	..	..	Rebuild panel boards
2	2	2	Trouble shooters and general shop
1	..	..	Warehouseman
1	..	..	Master mechanic
24	16	14	

PREPARATION-PLANT MAINTENANCE

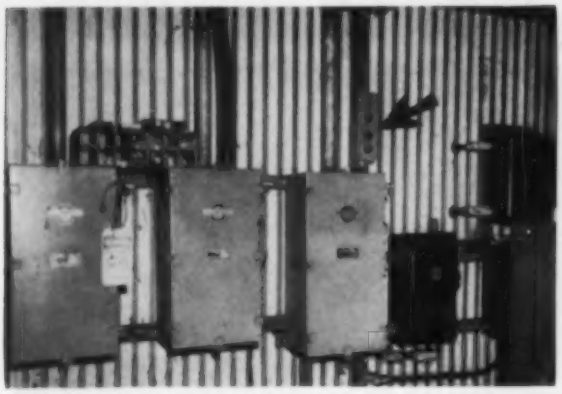
Removing 30% reject from coal and at the same time keeping preparation-plant down time at a minimum offers a challenge to maintenance men at Mathies cleaning plant. Maintenance is particularly challenging since operations are on a three-shift basis. To reduce maintenance costs, special methods and materials have been used at Mathies and Pittsburgh Coal plants. Specific examples of some of these are described in detail in this article.

OTHER PLANT METHODS

How the company-wide program pays off also is indicated by the various methods of effective maintenance found at other preparation plants, such as Champion No. 1 and Warden, several of which are described in this article. Preplanned maintenance performed by specialists, accurate maintenance records and application of special materials such as stainless steel, chrome steel, glazed tile and other ceramic materials have been found to pay off in lower maintenance costs.

At Champion, where W. K. Heinlein is superintendent and C. L. Kingan is master mechanic, the plant operates two shifts and maintenance is carried out on the third. An accurate log of all repair work is kept by the third-shift maintenance foreman so he can have at his fingertips the materials used for all repair jobs. Each job performed on the third shift

(Continued on p 101)

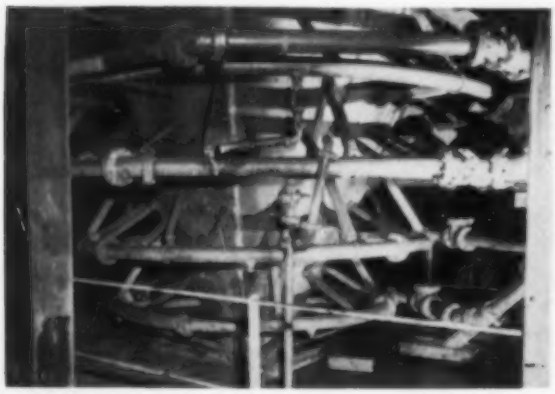


5. Detector Spots Grounds

Detecting grounds in electrical circuits before trouble occurs is another way of reducing down time at Mathies. A group of three lights located adjacent to fuse boxes normally are burning with equal intensity when all three phases of the 440-v tipple circuit are free of grounds. If a ground occurs in any of the phases, the light in that phase will go out and the other two will become brighter. Lights have one wire connected to one phase of the circuit and the other to ground, thus voltage across each light is 220.

To locate a ground when one of the lights goes out, a man is sent out into the plant to stop units singly for a few seconds. Another man remains at the signal lights and notes when the light comes back on. The unit that is stopped when the light goes on again is the one with the ground. A tipple communication set permits easy conversation between the signal station and the man checking the units in the plant.

If stopping individual units does not locate the trouble, attention next is focused on the wiring between the panel board and the switch board. Each circuit is broken and again the light is watched. As soon as the trouble has been located, maintenance men go into action. In addition to providing a quick method to locate grounds, the system detects small grounds before they have a chance to cause a plant outage.



6. Linings Cut Cone Wear

Rapid wear of chutes and the interior of a Chance cone were among the chief maintenance problems at Mathies when the plant went into operation. Initial maintenance procedure was to replace the worn section with steel. This usually required cutting out the old part, cutting a new piece of material to fit the hole and then welding it into place. The Chance cone originally was lined with ⅜-in steel rods, but these wore off rapidly and were the cause of concern among maintenance and supervisory personnel.

Lining chutes with a cement with traprock aggregate was suggested as a method to combat the abrasive action. A section of a chute, in a location where it would not be subjected to impact from falling rock or coal, was selected for an experimental application of this type of lining. A prepared commercial product was applied to the selected area and observed for wearing qualities. The material increased the life of the test section materially and it was decided to try it as a liner in the Chance cone.

The cone was relined in the usual manner with the ⅜-in steel rods and the cement lining was applied by troweling the material into place. Life of the lining was greatly increased and, since the time of the original coating, maintenance work has consisted mainly of periodic patching of small areas.

Success of the material in the Chance-cone lining led to application on all chutes except at points where they were subjected to impact from falling coal or rock. Another application of the material being tested is a coating on the skirt of CMI centrifugal driers and another test is under way to determine if it can be used successfully on the entire interior of the outer bowl. The bowl was prepared by tack welding standard 4-in mesh reinforcing wire to the bowl and then applying the material.

To speed setting and drying of the material after application, 1 part of water glass was used with each 5 parts of water. Without addition of water glass, setting time would be nearly like ordinary cement and would not harden sufficiently in the time available between shifts or over a weekend.

7. Weir Box Replaces Sprays

Trouble-free operation and a continuous full volume of water to desanding units has resulted from replacing conventional sprays with weir boxes. Units are designed to deliver water uniformly to the full width of the screen and thus assure good flushing of sand through the openings. Water is supplied to the boxes through a flexible hose.

14;00x24 tires weighted down by 5 tons of ballast held in a steel box welded to the wheel axles. Adjustment of the roller to conform with the bank slope is achieved by lengthening or shortening a 5-ton Simplex 85A ratchet jack welded to a 1-in free-moving pin mounted on the member connecting the roller to the dozer. It is possible to adjust the roller to positions between 45 deg above and 45 deg below horizontal. Thus it can be used for rolling the top or bottom of the bank.

8. Roller Packs Spoil Banks

Further evidence of benefits derived from getting everybody to contribute ideas for new methods is a special edge roller that simplifies the job of packing edges of contoured refuse banks. Designed and built by Clyde Rugh, master mechanic at Warden and Ocean mines, the roller is used with a bulldozer to pack the edges of refuse banks.

Pittsburgh Coal has been waging a successful battle against gob fires by leveling and packing refuse banks to seal off oxygen that might start a fire. Refuse piles are leveled and packed on top by a bulldozer and edges of the piles are consolidated with a roller. The special edge roller was designed and built to simplify the rolling job. It operates parallel to the edge of the bank, can reach 12 ft over the side, and can be used with any type bulldozer.

Before the new unit was developed, a roller attached to the rear of a bulldozer by a steel rope was lowered over the edge of the bank and moved up and down 90 deg with the edge of the bank. Not only was the method slow, but the dozer was subjected to more than normal wear because of the continuous reversing of direction.

It is possible to operate the new unit in any one of eight positions by a combination pin-and-ratchet-jack arrangement. The rolling and packing is done by two

9. No Shutdown for Belt Job

Among the outstanding achievements of the maintenance crew at Champion No. 1 is the ability to install new units without additional labor and without shutting the plant down. These men have put in a complete heavy-media plant and recently installed a 48-in refuse belt beneath a worn-out refuse flight conveyor (above) without interfering with plant operation. The latter job was made possible by everybody contributing ideas as to how the job could be done and then combining them into a workable design.

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is listed separately and such information as nature of work, time required to complete the job, material used and mechanic assigned to the job is recorded. This information is then typewritten for each job done on the maintenance shift and later is transferred to the proper place in the permanent log book. Thus it is possible to go to the log book and get information for computing detailed costs for any plant unit. The log book is particularly valuable when new material is being tried and a maintenance cost comparison with old material is needed. With the facts and figures before them, management can select the best material for any job.

To help maintenance men in their work, a complete equipment data book is kept at the plant office. Included in the book is information on motors, shafts, gears, bearings, pulleys, conveyor chains, belts and the like. Part ordering is made easy by use of this indexed book and there is little chance for the information to be misplaced.

Materials tested and found to reduce maintenance costs are stainless steel, chrome steel, lumnite cement with traprock aggregate for lining the conic section of a cyclone dust collector on the Christie driers; and glazed tile for lining launders and conveyors where it is not subjected to impact.

Maintenance men are primarily specialists at Champion, although they can perform general work. Usually, they have special skill in some maintenance field such as electric motors, pumps, conveyors and so on. As a result, they can handle a job much faster than general maintenance men.

There is assigned to each working shift a special equipment inspector who makes daily inspections of all units to spot jobs to be done before a breakdown occurs. These men are skilled mechanics capable of estimating what will be required in time and materials for a repair job. When the daily inspection is completed, they make out a written report to the plant master mechanic and leave it in his office. For the remainder of the shift these inspectors perform other duties.

The inspection report lists jobs to be done by plant unit numbers and is used by the master mechanic to schedule third-shift maintenance. When this schedule is set up, a report is made for the third-shift maintenance foreman, who then assigns the various jobs to his crew.

BOLTER on each side drills hole for 5-ft bolt while miner cuts across face.

HYDRAULIC FEED inserts bolt assembly for tightening to 150-175 ft lb.

BOLT IS TIGHTENED against 3 or 4 in of top coal which is left in place.

Concurrent Roof Bolting With

Roof-bolting drills mounted on Warwick's continuous-mining machines place bolts in Pittsburgh-seam roof while machines cut at face. The big benefit is a material reduction in timbering delays which formerly consumed up to 15% of shift time.

DETERMINED EFFORT to eliminate much of the timbering-delay time from the working cycle of a continuous miner at Warwick No. 2 mine, Duquesne Light Co., Greensboro, Pa., has been capped with a great measure of success as a result of mounting roof-bolting drills at the sides of the miner itself.

Two roof-bolters accompany the miner, inserting bolts into the roof while the machine works at cutting into the face of the 80-in Pittsburgh seam. Experience so far shows that the bolting can be done without introducing delays into the normal working duty of the machine. Thus, the 15% of shift time heretofore required for setting conventional timbers has been recovered in great part as actual operating time through the development of concurrent roof bolting.

Attachments to the continuous miner include two roof drills, one at each side immediately in back of the timber jacks, and a 26-hp motor and independent hydraulic pump mounted to the rear of the chassis under the discharge boom. The pump is equipped with four rotors, two for each drill, to provide independent hydraulic power for the feed and rotation motors of each unit. The rotation motors are designed for two-speed operation, fast for drilling and slow for tightening the bolts.

The drills are pivoted to permit operation within 30 deg either side of the vertical position. Pivoting also is hydraulically powered through toggle-mounted hydraulic jacks. Other refinements include (1) hydraulic brakes for holding the drills in operating position and (2) hydraulically operated auger guards which support the augers to eliminate any need for spudding holes and also support the wrenches while bolts are being tightened to eliminate the hazard of flying wrenches.

The drilling equipment consists of tungsten-carbide-tipped bits and 3-ft auger sections. The holes are started and drilled to a depth of 3 ft using a 1¾-in bit, and are finished to a depth of 5 ft using a 1⅝-in bit. The change of steel is necessary mainly because limited headroom above the drill will not permit a single 5-ft run.

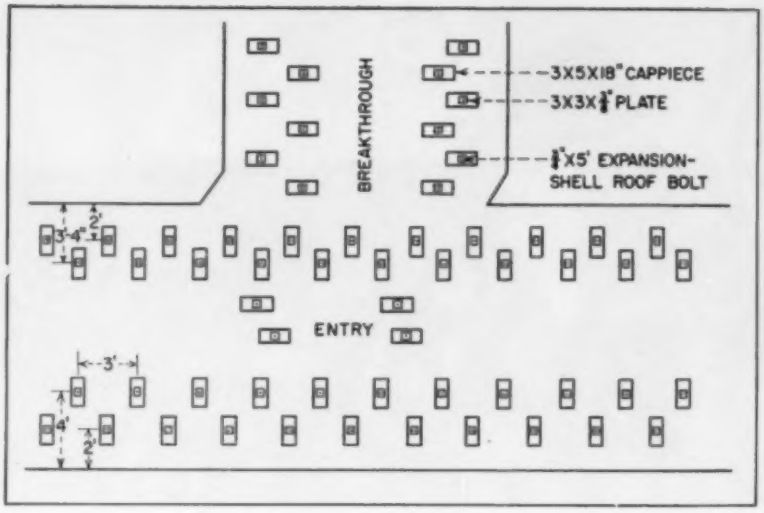
Bolts are 5 ft long and ¾ in in diameter and the expansion shells are 1¼ in in diameter. Roof plates consist of 3x5x18-in wood cap pieces and 3x3x⅜-in steel plates as washers.

BOLTING METHODS

The bolting pattern, as shown in the diagram, first was tested in an experimental section where an abandoned entry and crosscut were bolted and timbered in accordance with Pennsylvania Department of Mines directives. After the bolts had proved their ability to hold the roof safely, Duquesne Light Co. officials were authorized by the department to convert to roof-bolting without timbering in normal operations under usual roof conditions.

The pattern is based upon the 18-in advances of the mining machine, with rib bolts and center bolts being installed alternately on each side as the miner advances. The bolters have sufficient time to install a bolt while the miner is stationary as it makes a complete cut across the face.

Supplies are hauled into the mine to the shuttle-car discharge station in mine cars. The shuttle-car operator relays the supplies from the mine cars to the last open crosscut at the face.



BOLTING PATTERN is based upon the 18-in advances of the continuous-mining machine. Rib bolts are angled out to provide anchorage over coal.

SPECIAL HOOKS, hung from rib-bolt washers, carry power cables and hose.

Continuous Mining

From this storage point, the bolters pick up their own supplies as needed while the miner is tramming or during other idle periods. Their duties also include assembling the bolt by putting on the washer and cap piece, then the expansion shell.

Safety for both the continuous-miner operator and the roof bolters is one of the chief advantages in the system, since all three men work under the protection of bolts already installed.

Other advantages are in evidence, too. At Warwick, the ends of the wood roof plates serve as anchorages for the line curtain. Angle washers on the rib bolts are used to suspend mine-made support hooks for the power cables of the continuous miner and pick-up loader, and the water hose leading to the dust-control sprays on the miner.

The support hooks, incidentally, are formed at the mine shop from steel rod bent around pipe nipples that are free to rotate in the cradle of the hook. These rotating pipes permit the cable to be pulled through a series of supporting hooks without excessive abrasion of the jacket. The upshot is that the power cables and water line are suspended out of harm's way.

WARWICK MINING

Mining at Warwick No. 2 consists mainly of retreat pillar mining, although the photos accompanying this article were taken where a continuous miner was being used to drive six 14-ft entries through a solid area toward another tract of pillar coal. All development openings in pillar sections are 14 ft wide on 100-ft centers.

The normal unit crew for recovering pillars with a continuous miner includes operators for the miner, pick-up loader and shuttle car; two roof-bolters; a section mechanic; and a faceboss. Normal production for this 7-man crew is from 250 to 300 tons per shift. Four continuous-mining units now are in service at Warwick, with integral roof-bolting making it possible to achieve maximum operating time for these units.

Removing an 86x86-ft pillar with full regard for the safety of equipment operators and their machines demands excellent supervision and clearly defined methods of operation, according to company officials.

Established practice in recovering a pillar provides for driving a 15-ft-wide cut completely through the pillar, leaving a 10-ft-wide fender along the gob. When the cut through the pillar is completed, the miner recovers the fender, leaving only the necessary small stumps to support the roof until the machine withdraws. Bridge timbers are erected at the rib of the fender to protect the continuous miner while it cuts through the fender. This is the only timbering required since the machine is capable of reaching through the 10-ft fender without exposing the operator to unsupported roof. He is back under the bolted roof in the pillar cut and is further protected by the bridge timber across the breakthrough opening.

The roof fall is brought about on schedule by shooting out the stumps left in place by the continuous miner, but this is not done until the miner has started its second 15-ft cut through the pillar, where it has the protection of the new 10-ft fender. Three such cuts and the removal of four fenders constitute the recovery of a pillar. The fourth fender is recovered from the breakthrough between entries.

This cut-and-fender method of mining, along with a change from a 45-deg to a 90-deg fracture line, eliminates a number of machine moves that it was felt would be necessary if true open-end operations were attempted. In open-end slabbing, follow-up cuts could not be made unless roof breaks appeared on schedule. If caving did not occur when it should, it would have been necessary to move the unit elsewhere to keep it working in coal.

Officials in charge of Duquesne Light Co.'s coal-mining operations at Warwick include J. E. Elkin, general superintendent, and J. A. Younkins, assistant general superintendent, with headquarters at Pittsburgh. Operating officials at the mine office at Greenboro include John Stephenson, mine superintendent; E. D. Downer and M. B. Rafter, mine foremen; Isaac Rumble, safety engineer; E. M. Hickle, master mechanic; and Michael Minnick, underground maintenance foreman.

THIS 15-TON TRUCK, shown here being loaded for an 85-mi trip, has traveled over 300,000 mi in the last 3 yr. Top-notch preventive maintenance makes possible unusual records like this in the stripping operations of Chutz Bros. Coal Co.

Effective maintenance pays off for Chutz Bros. Coal Co. by . . .

Keeping Equipment at Work

For Management—
Less costly down time, minimum repair charges, longer useful life from equipment

For Customers—
Dependable delivery schedules, convenient handling with truck-hauled coal

For Equipment Operators—
Better working environment, steadier employment

MAC CHUTZ (left) superintendent, Wilf Zacherl, office manager, and John Chutz, general manager, are sold on the benefits of good maintenance. Don Chutz, superintendent of maintenance, was not present for the photo.

"WE'RE NOT A BIG COMPANY, we didn't start with a lot of money," says 33-yr-old John Chutz, general manager, Chutz Bros. Coal Co., Slippery Rock, Pa., "but we grew stronger on a steady diet of good maintenance." In pointing out that excessive down time resulting from mechanical outages will break a stripping operator faster than anything else, Mr. Chutz strongly advocates effective "first-echelon" maintenance by equipment operators as the best way to keep equipment digging.

"On stripping units like ours," Mr. Chutz continues, "down time will cost at least $50 an hour. As long as we keep that in mind, we never lose our interest in preventive maintenance."

The company was formed in 1946, after the three Chutz brothers, John, Mac and Don, returned from service in the armed forces. Mac is superintendent of stripping and Don is maintenance superintendent. They started in the coal-trucking business in a modest way, then a few years later purchased a Lorain 75 shovel and went on from there. Now the company employs 32 men, and average production is 9,000 tons per month.

Here's an example of how good preventive maintenance pays off. The trailer truck in the illustration may appear to be fresh from the showroom floor. Actually, it has travelled more than 300,000 mi in the past 3

STRIPPING DRAGLINE working from a leveled highwall bench, removes overburden up to 60 ft thick. Then the self-positioning auger (right) drills 30-in holes 100 ft deep under highwall to increase total recovery and lengthen pit life.

yr. It has yet to suffer a $50 accident and has never had a flat tire. This performance is not unusual within the company; four similar units have rung up similar records but with less total miles on the odometers. Last Christmas the operators received personal watches from management in recognition of this service. Each year other worthwhile awards are presented as the record continues.

The maintenance investment also pays off in helping the company keep its promises on delivery dates, thus convincing customers of the wisdom of reordering Chutz coal. In 3 yr of hauling coal daily to a customer in Ashtabula, Ohio, 85 mi away, not a single delivery has been missed, Mr. Chutz reports. And the biggest dividend of all is that equipment operators soon develop a feeling of pride in their well-kept units. Equipment abuse is unheard of and labor turnover is not a problem.

HOW THE COAL IS RECOVERED

The 3-ft Middle Kittanning seam, as it shows up in "islands" in hilly terrain, is the scene of the company's operations. The coal is stripped to a 60-ft highwall, then augered to a depth of 100 ft beyond the highwall. A Cardox-Hardsocg 30-in auger is used in this final operation.

Cover is removed by a 1¾-cu yd Lorain 820 high-lift shovel in 50-ft-wide cuts up to a 35-ft highwall. The shovel is followed by a 3¼-cu yd Osgood 1007 dragline which removes the remaining overburden up to a 60-ft highwall. The dragline works from a highwall bench constructed by an accompanying bulldozer.

Loading is done by a 1-cu yd Unit loading shovel, after the top of the coal has been cleaned by a powered broom and a Galion 104 road grader, the latter also maintaining access roads to the pits. The coal is hauled out of the pit in two 10-ton-trucks.

Overburden preparation is done by a contractor who uses a horizontal highwall drill to break up the 55 ft of hard shale which makes up most of the cover as the stripping limit is approached.

In the auger-mining phase, two men drill four or five 30-in holes per shift, each hole yielding about 20 tons of coal. The cutting head is equipped with Firthite tungsten-carbide bits. The pace of this operation is stepped up considerably since the auger-drive engine also is used in retrieving the 6-ft auger sections from the previous hole and in moving the entire unit into position for drilling a new hole.

In moving ahead to start a new hole, the auger carriage is lowered onto a pair of pipe skids by raising the four corner leveling jacks with the power of the engine. With the engine at the rear of the carriage, one end of a wire rope is connected to an outrigger which moves with the engine, the rope is laid through a fixed sheave at the rear of the frame and the other end of the rope is anchored at a point beyond the new position of the auger. As the engine is moved forward under power, the rope pulls the rear of the unit along the skids into its new position. The rope then is laid through a fixed sheave at the front of the frame, and returning the engine under power to the rear pulls the front of the unit into its new position.

Finally, the unit is leveled on the jacks at its drilling position and the skids are moved ahead for another advance. A 1-ft rib is left between holes.

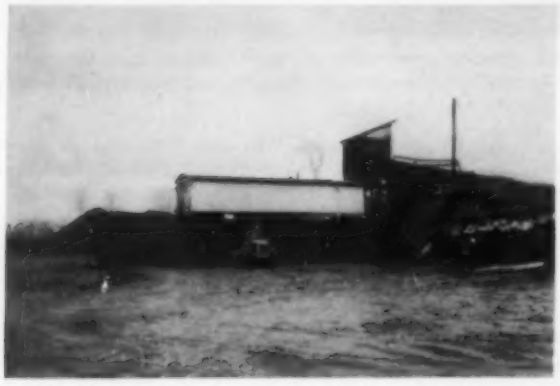
The auger operations serve the double purpose of (1) increasing total recovery for a given investment in overburden removal and (2) permitting operations to continue to the relatively-high 20-to-1 stripping ratio, thus reducing the time that would be lost in frequent equipment moves. Without the auger, the operations would be economically limited to a lower highwall.

HANDLING THE MINED COAL

As previously mentioned, coal is hauled from the pit in two 10-ton dump trucks, with hired trucks being employed as needed. Maximum length of haul has been set at 10 mi. For this reason, and because the tracts to be mined are widely separated, certain concessions had to be made in setting up the other coal-handling facilities. Recognizing that the tipple and screening facilities would have to be moved from time to time, Chutz brothers sacrificed a lot of other considerations in order to keep the tipple simple and portable.

For example, elevated bins for run-of-mine or for screened coal were ruled out because they would be expensive to build and difficult to move and rebuild in other locations. The problem of storage still remained to be solved, however, and the solution came in the form of a high-lift tractor-loader. A 1-yd Hough Payloader takes the place of storage bins, in the opinion of the owners, since it

PREVENTIVE MAINTENANCE by assigned operators is the backbone of the Chutz program for keeping equipment in order. Each operator makes daily entries in log book to provide running record of work done and reasons for breakdowns.



SIZING SHAKER in a portable tipple makes four sizes which are stored on the ground to eliminate elevated-bin structure. Tractor-loader substitutes for bins.

HOBBY WITH A PURPOSE—Chutz brothers have their fun tinkering with this 100-mph Hot-Rod, which is entered in races all over the country. It's an unusual advertisement.

permits ground storage and rapid recovery of either raw or screened coal as needed.

Trucks from the pits dump into a hopper over a company-made reciprocating feeder which places the coal on a sizing shaker. The 3-section shaker passes minus ¾-in slack, ¾ x 1¼-in stoker coal and 1¼ x 4-in lump into storage pens on the ground under the shaker. The plus 4-in lump passes off the end of the shaker to ground storage. The Payloader takes over in getting the coal off the ground and into market-bound trucks.

A stockpile of about 1,000 tons of run-of-mine is maintained near the tipple where the Payloader can retrieve it for direct sale or for sizing. The stockpile makes deliveries independent of pit operations.

The entire production of the company is hauled in trucks. The five 15-ton tractor-trailer units make daily long hauls to power plants at Ashtabula and other cities along the Lake-Erie shore. Local truckers provide a brisk retail-coal market.

MAINTAINING EQUIPMENT

Chutz Bros. maintenance program is based upon two fundamental policies: (1) permanent assignment of operators to specific units and (2) standardization in types of equipment.

There is a morale factor involved in the first policy. It is first determined that a prospective operator is capable of using the equipment safely and properly and of performing preventive-maintenance duties correctly. After his assignment, the condition of his machine and its presence in the work line-up without undue down time are accepted as marks of his ability.

Standardization in types of equipment relieves the company of the necessity of keeping a large inventory of spare parts, and permits the welder-mechanic to become rapidly familiar with maintenance and repair duties, which are more or less repetitive as a result of standardization.

The five long-haul tractor-trailer units and the two dump trucks hauling from the pits to the tipple all are built on International L-200 chassis. Both the stripping shovel and the dragline are powered by Waukesha diesel engines and both of the company's bulldozers are Caterpillar D-8's.

Stripping is a 3-shift operation. During daylight hours the oilers on the stripping units spend most of their time working over the exteriors of the machines; at night they give most of their time to keeping the interiors spic and span. The yellow finish on all units is retouched as necessary and frequently waxed.

A final control on maintenance schedules is obtained from the operators' daily log books. Each operator daily records the hours of service or mileage, length of down time and the reasons for outages, maintenance duties performed and any unusual behavior he observes in the machine. Don Chutz makes it part of his job as maintenance superintendent to read each of these logs every day. Such close attention to detail is effective in heading off possible breakdowns.

KENNAMETAL*

cuts bit costs in half

...produces greater marketable tonnage

Here's what happened when Pennsylvania Coal and Coke Corp.'s 1800-ton per day Marsteller Mine installed sets of Kennametal Sintered Carbide Bits on its 9 continuous miners. Superintendent Pete Wilson reports that production is averaging 2990 tons per set . . . that the Kennametal cutting edges can be reconditioned 5 to 6 times. Power consumption is lower, and there is less penetration in bottom rock.

Bit cost per ton has dropped to $.0050 (less than half that of other bits). Fines in 3/4 to 2 1/2-inch screen coal are down 2 1/2 percent — proof of the important increase in this mine's quality commercial tonnage.

These operating efficiencies are possible because (1) tough Kennametal cutting edges have both greater shock and wear-resistance than any other tungsten carbide and (2) Kennametal's advanced tool design provides the proper bits for any cutting job. If you have a cutting or drilling problem, ask your Kennametal Representative to show you how the right Kennametal bit can solve it for you.

Kennametal Sintered Carbide Bits in one of Marsteller Mine's Joy miners. Style UMR4 Bits are used on rotor drum, U4R3 in side chains. Seam: "D", or Freeport.

Look for the name of your Kennametal Representative in the yellow section of your phone book, or on the back of your Kennametal Price Book — or, write direct.

*Registered Trade-Mark

World's Largest Manufacturer of Tungsten-Carbide

Drill Bits, Cutter Bits, Roof Bits, Strip Bits

KENNAMETAL*

KENNAMETAL INC., MINING TOOL DIVISION

BEDFORD, PA.

General Offices and Main Plant at Latrobe, Pa.

Foremen's Forum

Seven Deadly Sins In Mine Supervision

Sometimes it's important to know what NOT to do, and here is an accent on the negative. These seven deadly sins are signposts on the shortest, surest road to supervisory suicide. Don't follow them.

GRANTED there may be more than seven supervisory sins, the selection of this number perhaps will force us to think about the worst ones. Here they are:

1. LAZINESS is aversion to work of any kind. The first sign of laziness is procrastination, the habit of postponing decisions or actions that should be made right now. Then even those duties which finally are taken on are completed only to satisfy minimum standards. Soon, visible signs of supervisory laziness become evident. Housekeeping is scandalous, supply records are in a frightful mess, silly quibbling becomes more frequent and the accident rate creeps upward. Finally, production falls flat on its face.

Faced with this state of affairs, the lazy supervisor will be darn lucky if he can get his mine or section back on the ball before others notice the havoc. More often than not, he will have to be bailed out by a team of experts from the front office. Enough said! The front office would be guilty of mismanagement if it decided to string along with the lazy boss.

2. EGOTISM is offensive self-conceit. It goes to extremes, far beyond the reasonable and proper self-confidence every good supervisor should have. The danger signal is in the quiet, early boasting that follows one's first conquest. The trumpeting becomes louder and longer until it is recognized as the only distinguishing feature of the egotist. He becomes known to everyone as "that guy who blows his own horn." This supervisory sin is dangerous because it repels the people who work with the egotist and for him. His superiors at first may take a humorous view of the matter, but the view becomes less humorous all the time.

Kipling hit the nail on the head when he wrote:

"I am King," shouted the cub,
In the pride of his earliest kill.
But the jungle is big,
Let him think and be still."

The step from self-conceit to self-deceit is mighty short. The egotist never is the ball of fire he thinks he is.

3. SURLINESS is ill-natured lack of consideration for others. Its worst manifestations are anger and loss of temper. These inexcusable outbursts are less common, however, and maybe even less dangerous, than the cumulative daily instances of surliness. The surly boss has a smart or short answer for everyone who approaches him with an idea, a suggestion or a request. Soon there are no more approaches. Everyone avoids him, and the job in that mine or section becomes a dull plodding routine. The result is a crew of clock-watchers—"How long before we get out of here."

Sometimes the surly boss merits sympathy. A man in a responsible position, who lacks normal self-confidence, may adopt surliness as a defense. Thus, he hopes to discourage others from probing his feelings of uncertainty.

The sight of an angry boss is degrading to the profession of supervision. Long before conditions reach the stage where a boss feels justified in losing his temper, he should have been using all his supervisory techniques and privileges to correct those conditions.

On the other hand, everyone seems willing to give the even-tempered boss the benefit of a doubt, almost every time.

4. INCOMPETENCE is incapability of doing what is properly required. It is a foregone conclusion that

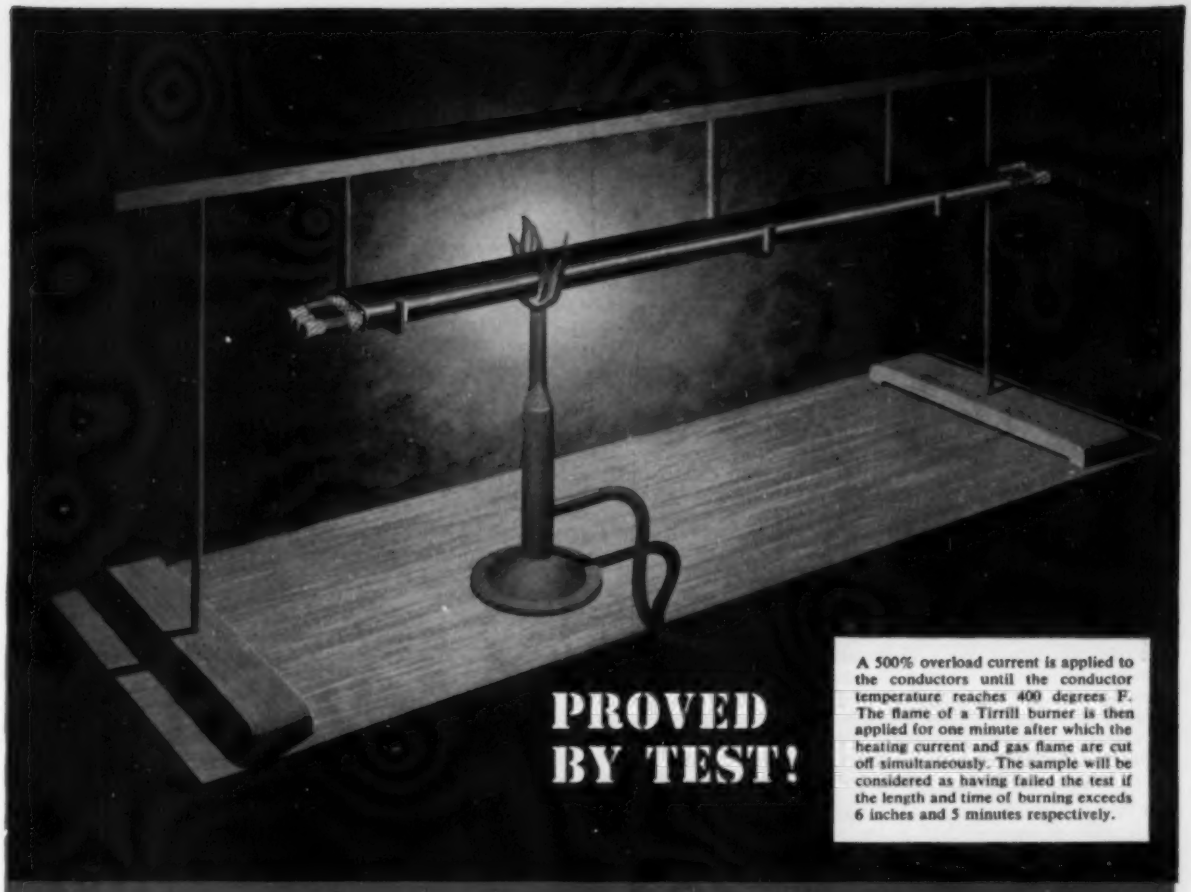
---

Foremen's Quiz: No. 12 . . .

How do you ACCEPT CHANGES?

HERE'S STILL ANOTHER quiz for mine supervisors. Are you a "stick-in-the-mud?" Or are you still "young in spirit?" Place a check in either the "Yes" or "No" block after each question then turn to p 110 for discussion.

1. **Do you scoff at new ideas before giving yourself a chance to think about them?** Yes ☐ No ☐
2. **Do you think changes in operating methods are "just too much trouble?"** Yes ☐ No ☐
3. **Do you really like to see new and different types of equipment come into your mine?** Yes ☐ No ☐
4. **Have you ever said, "Our men won't like this new-fangled way of doing things?"** Yes ☐ No ☐
5. **Do you handle your job today exactly as you did a year ago?** Yes ☐ No ☐
6. **Is the new man in your section too dull to learn anything?** Yes ☐ No ☐
7. **Do you find yourself wishing for the "good old days?"** Yes ☐ No ☐
8. **Do you ever dream up schemes for fully automatic mining?** Yes ☐ No ☐
9. **Do you immediately embrace all new ideas before giving yourself time to think?** Yes ☐ No ☐
10. **Are you interested in short- and long-range forecasts pertaining to the coal industry?** Yes ☐ No ☐



PROVED BY TEST!

A 500% overload current is applied to the conductors until the conductor temperature reaches 400 degrees F. The flame of a Tirrill burner is then applied for one minute after which the heating current and gas flame are cut off simultaneously. The sample will be considered as having failed the test if the length and time of burning exceeds 6 inches and 5 minutes respectively.

Flame-Retardant

U. S. Royal Mine Trailing Cables

Write for free illustrated booklet, "U. S. Electrical Wires and Cables for the coal mining industry."

Ordinary coal mine trailing cables – when ignited by either mechanical injury or overload – will propagate flame and may carry the fire to other sections of the mine. *But not U. S. Royal Cables!* They are jacketed with a special flame-retardant 60% neoprene compound which also withstands cutting, chipping, abrasion, grease and oil. Performance grade rubber insulation is used up to 2000-volt service. Cables for over 2000-volt service are insulated with Uskorona-1 oil base insulation and have a semi-conducting tape over the conductors.

U. S. Royal gives "Service beyond price and specification" because United States Rubber Company is the only electrical wire and cable manufacturer to grow its own natural rubber, make its own synthetic rubber and plastics. Such control of the manufacturing process results in a *quality* product. Available in black, or gold for better visibility.

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US RUBBER

Accepting Changes

Rate yourself on this one (p 108). We think only the answers to Questions 3, 8 and 10 should be "Yes." Here are our reasons.

1. We hope you checked No. If your answer is Yes, we wager you've eaten a great number of your own guffaws. Give a new idea a break before you reject it. Be sure your rejection is based upon a sound evaluation of how its shortcomings outweigh its merits. On the other hand, a strange idea may be a good one. It would be embarrassing to summarily reject such an idea, then find it coming back to solve some of your problems.

2. Changes, though sometimes troublesome, are the stuff of which progress is made. If changes are "just too much trouble," your days in this business are numbered. While you spend valuable time deciding whether or not you should go to the trouble of changing your methods, someone else may have done so already. The changes, if well planned, immediately benefit the fellow who adopted them, and you are at a disadvantage. It's easier to keep up than to catch up after you have fallen back.

3. If you checked Yes, that's the spirit. You can be sure someone has made a thoughtful decision that the new equipment will have a beneficial effect on costs or quality. Your enthusiasm in accepting new types of machines, your interest in finding out what makes them tick and your perseverance in trying to get the most out of them during the shakedown period and thereafter are large assets to your company. And you won't suffer when it becomes evident that you are enthusiastic, interested and tenacious in getting the best out of the newest.

4. Don't accuse the men of dragging their feet until you are quite sure you have exhausted all possible methods of selling the change to them. Wet drilling, roof bolting, longwalling and continuous mining—all new, novel and strange—are examples of ideas which were properly introduced and fully accepted by the majority of mineworkers, even though there may have been early trepidations. The secret lies in being convinced of the worth of the idea yourself before you try to sell it to others.

5. We think the answer to this one should be No. Each of us grows a little each day. In the past year there must have been some opportunity to learn at least a few new lessons in how to do a better job, how to make better use of equipment, how to expend supervisory energy more wisely, and how to improve safety. A fellow who holds precisely similar opinions today as he held a year ago or 20 yr ago is not growing much. New knowledge is constantly being turned up to serve as a gage against which we can measure our opinions. It isn't a matter of changing fundamental beliefs; it's a matter of refining them. The same is true in doing our jobs.

6. The new man may not be dull by any standards. New men also represent change, and the crux of this problem may lie in the fact that you sorely miss the older employee whose place is taken by this new fellow. You didn't have to worry too much about teaching the older employee, but you must assume the time and trouble to teach the new man what he will need to know. And his apparent dullness may reflect the fact that you have forgotten how to teach. A new man should be a welcome challenge, not a burden, to a supervisor. You may have inherited your older employees, but you can teach this new man to your standards. That's a big responsibility. Your attitude toward him is a dead giveaway as to how well you can accept changes.

7. Perish the thought! Consult past and present injury and fatality statistics; we feel certain you will agree these are better days. That is only one indicator of our progress. We have come a long way through our willingness to accept change, and we can make further progress if we intelligently adopt modifications yet to come.

8. If you have tried to devise schemes for such things as automatic mining, you probably are a foreman who welcomes changes and one who takes time to think about what the changes will bring. Almost every worthwhile idea started with a so-called daydream. Somewhere in our travels we have either read or heard this: "Don't be ashamed of building 'castles in the air', as long as you follow through by trying to put foundations under them."

9. Be careful here. Carefully criticize an idea in your own mind before you flatly support its adoption. If it strikes you at first as being plausible, try to think of some reasons why it might not work. See how it passes this test. Remember, ideas for mining must above all be practical.

10. Big changes are bound to come. The foreman who welcomes change and who accepts it in a healthy manner is interested of course in what the industry will be like both in 1954 and in 1975 or later. Surveys and forecasts which are based on sound estimates of coal's stake in the future are vitally necessary in giving us purpose and direction. The alert, progressive foreman will be interested in these forecasts because he is the kind of fellow who wants to know as much as possible about where he is headed.

in the give and take of the selection process, only competent men will be chosen for supervisory positions. But this kind of incompetence creeps in later. It indicates failure to continue to learn and failure to grow in one's job. There is no more-favorable environment for growth than that to be found in a supervisory position.

Sometimes this incompetence is a result of the first sin, supervisory laziness.

5. IMPATIENCE is lack of composure and intolerance of interruptions that arise as a result of ordinary human shortcomings. If there is any hope in the foreman's mind of ever having a smooth, integrated operation and a crew that works as a team, he must be patient. He will have to teach, then he will have to teach the same things again—and maybe again. Any hint of impatience only sets the process back.

Before the supervisor can indulge in the luxury of impatience he must first ask: Have I taught as well as I should? Do I really have the answers the men need to do a better job? Have I looked for the causes which lead to these interruptions?

6. DISHONESTY is lack of straightforwardness or fairness. If you want examples, here are two we offer with tongue in cheek:

1. Recovering healthy stumps with a red pencil on the office map, when you know darn well they're under a fall.

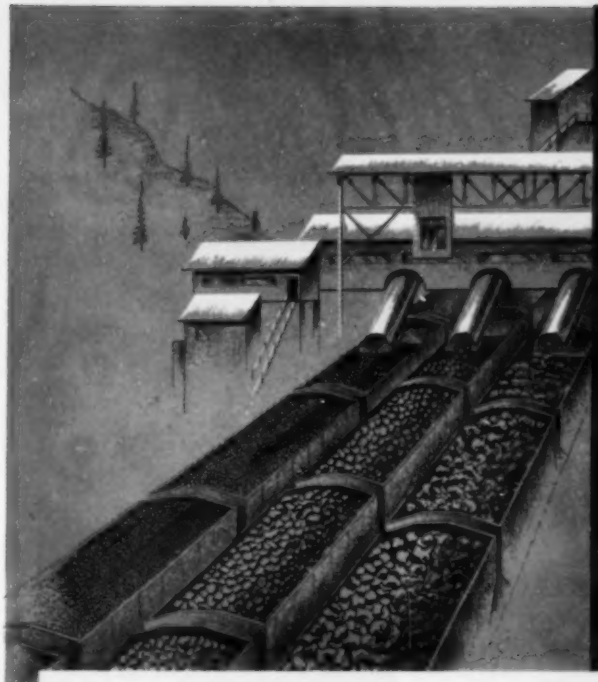
2. Picking up supplies and parts in neighboring sections to keep your own cost report sweet, regardless of what happens to the other fellow's costs.

We'll not hit too strongly at these, since we can offer no better method for retrieving those stumps, and we have little sympathy for the fellow who permits costly supplies to lie around unguarded.

There are more serious examples, however. Usurping the ideas and suggestions of others as one's own is unforgivable. Each of us likes his due credit. Failure to come through on promises, misleading others and withholding information from those who need it in doing a better job are examples of dishonesty which can wreck a good crew or a smooth operation.

7. BREATHLESSNESS, a term we've been forced to adopt for want of a better one, describes the boss who continually operates in a high dudgeon. He fabricates his own crises if none develop naturally. He hopes his long tale of woe will convince someone that he is indispensable in running his crisis-ridden section. But the danger lies in the fact that this bug of breathlessness may infect all others in the section to the point of forgetting safety. Furthermore, there is no reserve for meeting a real crisis. Like Notre Dame football, do each chore with dispatch, then come down hard on the big ones. (Is that thunder we hear in Iowa?)

This isn't offered as preaching. Sometimes we are so beset with advice on what we should do that we lose sight of the fact there are things we should not do.



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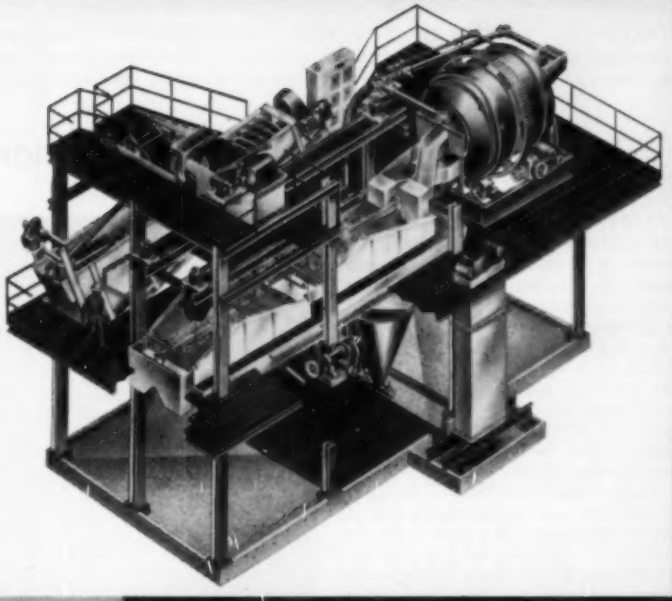
Today's coal market demands **modern** cleaning equipment designed to produce a **premium-priced** product, even from substandard workings.

WEMCO MOBIL MILLS, employing Heavy Media Separation, make available the most modern, most economical method of coal cleaning for the vast majority of operations. They assure high yield of **salable** coal at predetermined grade to meet varying market demands.

Mobil Mill cleaning is **precision cleaning**. It provides close control of washing operations and the flexibility needed for efficient cleaning over a wide range of sizes and grades. For coals containing middlings, the WEMCO MOBIL MILL with Double Drum Separator is the **only** HMS plant capable of producing **three** products by absolute gravity control. Accurate segregation of bone and other middlings from true float coal and true refuse permits re-crushing and washing of this middling to produce a salable third product.



To fit your particular requirements, Mobil Mills are offered in a number of sizes with a choice of three basic types:

1. ***Drum Type Mobil Mill** for accurately controlled washing of a full range of sizes from 8" to ¼" with capacities up to 420 TPH.*
2. ***Double Drum Type Mobil Mill** for efficient cleaning of coal having complicated middling and washing characteristics. Capacities dependent on individual problem.*
3. ***Cone Type Mobil Mill** for efficient, large volume production of fine coal in sizes 4" to 3/32", with capacities up to 420 TPH.*

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Operating Ideas

INSTALLATION TIME IS HALVED with plywood temporary stoppings, as compared to conventional plastered wood stoppings. Wood-fiber plaster applied to the top, bottom and joints makes the plywood stopping practically airtight.

EASY HANDLING, little waste and re-use are plywood advantages. Sheets are cut rapidly with a sharp hand saw.

Sheet Plywood Halves Construction Time for Stoppings

FOLLOWING THE LEAD of the Red Jacket Coal Corp., several other large producers in southern West Virginia are beginning to use plywood for building temporary stoppings. Red Jacket started with plywood nearly 2 yr ago and now is using it exclusively for all temporary stoppings at its seven mines.

The product, made by the W. M. Ritter Lumber Co. at its mill near Wilmington, N. C., is of gum, a southern hardwood, and is 3-ply, 7/16 in thick, weather-bonded with waterproof glue. Red Jacket purchases sheets in three sizes, 3x6, 4x6 and 4x8 ft, depending on the seam thickness where they are to be installed.

While labor saving is the principal advantage, ease of handling and more effective transmission of ventilating currents make the use of plywood desirable. At Red Jacket, a temporary plywood stopping requires only about half the time it formerly took to build a stopping of boards made reasonably tight with battens and/or wood-fiber plaster. Plywood stoppings are made practically airtight with only a small quantity of plaster at the top, bottom and joints.

Large quantities of stopping material in the form of plywood sheets are relatively easy to handle and transport to needed locations in the mine. Total weight of the material used is considerably less than that required with the old-type stoppings. The plywood saws easily and there is practically no waste.

FULL-SIZED PLYWOOD SHEETS are rapidly nailed to post. Open spaces to the roof are quickly covered with lapped pieces.

In erecting a stopping, sawed posts or posts with at least one sawed side are set on 6- to 8-ft centers, depending on the length of the plywood sheets and the width of the place. Full sheets then are nailed to the posts, usually with butt joints. Filling out the spaces to the roof is done with strips of plywood lapped over and nailed to the full sheet.

Easy reclamation is another advantage. It takes but a short time to knock the sheets off the posts, pull out the nails and make the material ready to move to the next location. In re-using the plywood, there also is little waste, even of the filler strips, since by using lap joints they seldom have to be trimmed.

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BUT ONE'S A MASTERPIECE!

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You can copy the physical specifications of a Gargoyle oil, but you can't copy the 88 years of experience and skill that transform these specifications into products of unsurpassed quality. Vary the ingredients or the way they're compounded even slightly, and you wind up with an oil that, at best, may do no harm. But neither can it possibly bring you the benefits the original was designed to deliver.

This *inherent quality* is only part of the Gargoyle picture. With it goes the world's greatest lubrication engineering service. We analyze your plant machinery—work with your personnel to set up a complete program of *Correct Lubrication* that will improve your production, cut maintenance costs.

Why accept substitutes for *your* plant?

SOCONY-VACUUM

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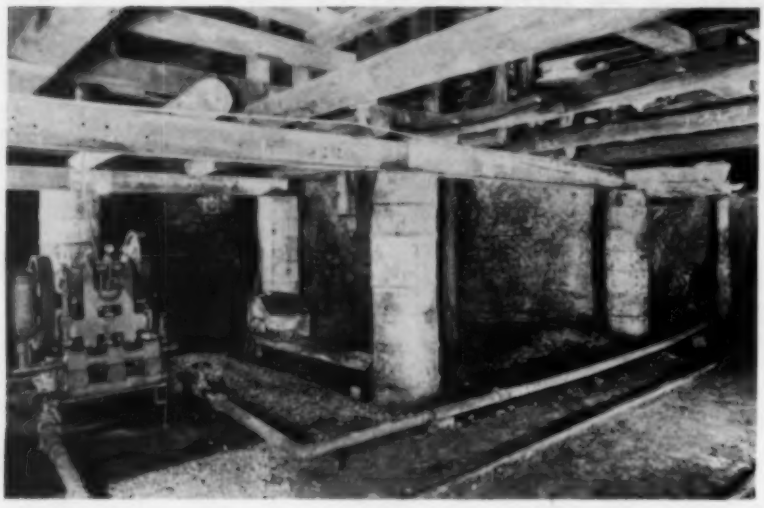
Correct Lubrication

FIRST STEP IN CUTTING COSTS!

SOCONY-VACUUM OIL COMPANY, INC., and Affiliates: MAGNOLIA PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

Discarded Oil Barrels Cut Cost of Concrete Pier Forms



CONCRETE PIERS FOR ROOF SUPPORTS at junctions and for supporting I-beams and crossbar timbering on straight haulage roads not only mean permanency, but add up to a very great safety factor in the case of haulage wrecks, points out John Lyons, retired safety engineer, Bell & Zoller Coal Co., Zeigler, Ill.

Large savings can be made in building concrete supports with forms made of empty 55-gal capacity non-returnable oil barrels found in quantity around any mine. Bell & Zoller has been using this type of support at its Zeigler mines for many years without one failure and many of the forms have been 8 and 9 ft high, Mr. Lyons reports. One installation underground is shown at the left.

The barrel forms are prepared in the surface shops. Their ends are cut or burnt out with a torch, and sufficient barrels then are spot-welded together to make the height required for the underground pier.

The place selected for the underground pier is dug down to a hard bottom and the barrel form is set vertically. Ready-mix concrete then is put into the form, and when it sets the pier is ready to support the intended timbering. The barrels are sufficiently large and strong for any supports required in large timbering jobs, Bell & Zoller's experience has shown.

Savings are made in eliminating the use of lumber for the form, and the barrel forms also can be made with less labor cost than wood forms can be built.

The standard barrel has a content of 8.89 cu ft and is 34 in high. Putting two of them together provides a form practically 6 ft high. With ready-mix concrete bought in the area for $15.88 per cubic yard delivered, the 16 cu ft needed would fill a barrel pier 6 ft high at a material cost of $9.40.

The conventional pier, 2x2 ft, would hold 24 cu ft of concrete at a cost of $14.11. In addition, there would be added the cost of the wood used in building the forms, and no doubt the higher cost of the labor needed for their construction.

How To Recharge a Repaired Cell in a Storage Battery

PROPER RECHARGING of a repaired cell before returning it to service, according to service engineers of Gould-National Batteries, Inc., is mighty important.

The best method requires separate charging equipment to give the repaired cell the extra charge it will need to restore it to operating condition. If the cell has dried out through losing its electrolyte, it will need a prolonged charge at the finish rate. In other words, a cell rated at 400 amp-hr may require 1,200 amp-hr of charge if it has dried out considerably. Therefore, damaged cells should be repaired as soon as the damage is discovered to eliminate this time-consuming extra charging.

The amount of charge may be determined by taking readings of voltage and gravity at the end of the normal charge and every hour thereafter for 4 hr. If the readings remain constant for 4 hr, the cell may be returned to normal duty. If the readings vary, additional charging at the finish rate should be given until the voltage and gravity readings remain constant for 4 hr. A badly damaged or shorted cell that will not give four constant readings should be discarded. In all cases, the specific gravity of the repaired cell must be adjusted to the proper value after the charge is completed.

In many instances, however, it is not possible to arrange for such special charging. Where only the regular charger is available for both normal and repaired batteries, the repaired cell can be suitably charged by cutting it out of the circuit during operation of the equipment (Fig. 1) and putting it back in during charging (Fig. 2). This procedure should be followed for at least two charging cycles to permit the repaired cell to get its additional charge.

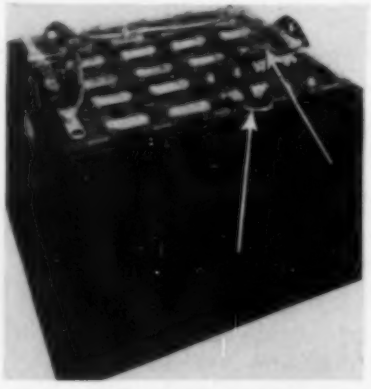


FIG. 1—CABLE JUMPERS with automotive-type terminals cut repaired cell (second from right in front row) out of circuit while battery is in service.

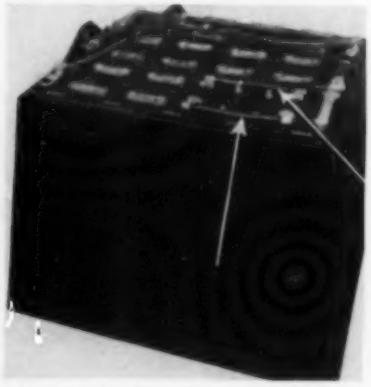


FIG. 2—JUMPERS ARE CONNECTED to the repaired cell during normal battery charging, thus providing repaired cell with its necessary extra charge.

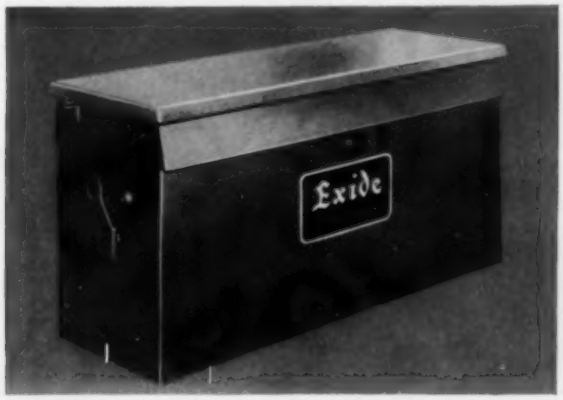
The jumpers required to cut out the repaired cell during operating hours are made of 18-in lengths of No. 4 rubber-covered cable with automotive-type terminals soldered to each end. The posts of the repaired cell must be built up to proper size to receive the terminals.

SPEED UP YOUR HAULAGE AND SAVE

. . . with low cost Exide-Ironclad power!

YOU CAN count on Exide-Ironclads to help speed up car changes, keep loaders busy and main line haulage moving fast. This means you get more trips per shift, more production per man-hour with less cost per ton handled. Exide powered equipment will handle as much tonnage during the last hour of the shift as during the first. Lower costs for operation, maintenance and depreciation make Exide-Ironclad batteries your best power buy—AT ANY PRICE!

THE POSITIVE PLATES are the heart of any battery. Only Exide uses a slotted tube construction. By use of tubes, more active material is exposed to the electrolyte, providing *greater power*. Also, more active material is retained, giving *longer working life*.

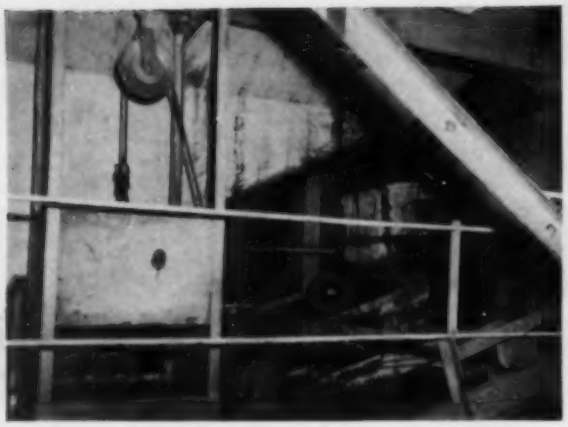


THE NEW THRIFTY HAULER! The improved shuttle car battery using *non-oxidizing* plastic power tubes for longest battery life, more capacity in the same space. For full details, call your Exide sales engineer—write for Form 1982 (Installation and Maintenance of Motive Power).

Your best power buy
. . . AT ANY PRICE!

Exide®
IRONCLAD® BATTERIES

Exide INDUSTRIAL DIVISION, The Electric Storage Battery Company, Philadelphia 2, Pa. • *Exide Batteries of Canada, Limited, Toronto*

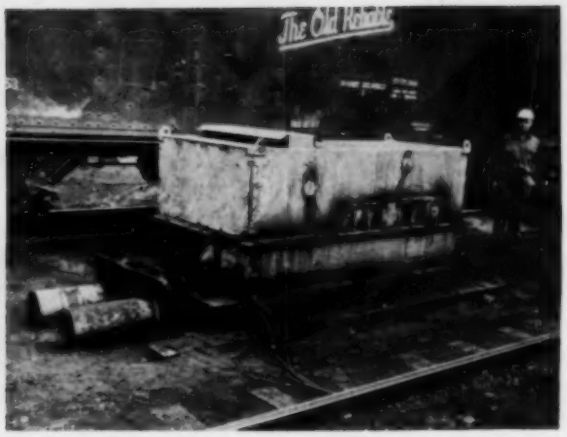


Automatic Take-Ups Effective At Lower End of Belts

UNUSUAL—both in their positioning and design—are the automatic take-ups of the two stoker-coal elevating conveyors in the Hendrix preparation plant of the Consolidation Coal Co. (Ky.) Div. Pittsburgh Consolidation Coal Co., Deane, Letcher County, Ky. (For plant description, see p 86 of this issue.)

The take-ups are located at the bottom ends of the belts. The base, or frame, of the tail pulley for each conveyor is mounted on flanged wheels, and tension is kept on the belt by a wire rope attached to it and running through two pulleys to a counterweight. One of the counterweights is shown at the left in the photo above.

This method of automatically maintaining belt tension is cheaper to install and requires no headroom, as compared to a weight acting directly on a system of three take-up pulleys.



Direct Pull on Hoist Lengthens Rope Service

FEWER ROPES for men to cross, and better rope life and less breakage because there is no bending around sheaves, are advantages of an improved installation method for railroad-car spotting hoists at the Hendrix mine, Consolidation Coal Co. (Ky.), Div. Pittsburgh Consolidation Coal Co., Deane, Letcher County, Ky., devised by Robert L. Blake.

Shown in the photograph is a Brownie Type HKI hoist rated at 24,000-lb rope pull, which is one of three installed in this improved manner at Hendrix mine.

The hoist is placed beside its loading track, upgrade from the plant and pointed so that the rope goes straight to the car. It is on a sliding base and is anchored to foundation uprights by bolts acting against two compression coil springs. Angle-iron guides bolted to the foundation permit the rope end of the hoist to swing several degrees to align itself.

How to Make an Impact-Wrench Tester

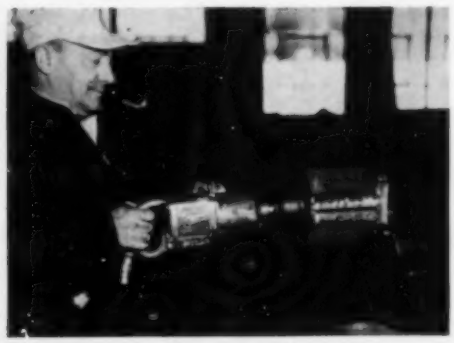
TESTING REPAIRED EQUIPMENT in the shop before it is returned to service in the mine is one way of keeping kinks out of producton operations. With this in mind, George N. Truby, master mechanic, Springdale mine, Allegheny Pittsburgh Coal Co., Logan's Ferry, Pa., developed the impact-wrench tester, illustrated, with the help of his shop force. The purpose of the unit is to assure the roof-bolters in the mine that their impact wrenches will be able to generate the necessary 200 ft-lb of torque after they have been stripped down and overhauled in the shop. Furthermore, the mechanics who make the repairs can find out immediately whether the wrenches are in top-top shape when repairs are completed.

The body of the testing device consists of a 6x6x1-in steel base plate and a 6-in-high steel cylinder cut from a 6-in pipe. These are welded together as shown. The base plate is drilled at the center to receive a ¾-in bolt, the head of the bolt being tack-welded to the base plate to keep the bolt from turning.

Inside the cylinder is a 5x1¼-in journal spring from a 15-ton locomotive, and this spring is capped by a 1-in steel plate which is designed to move freely up and down inside the 6-in cylinder. The ¾-in bolt extends completely through the device to receive a conventional roof-bolt nut.

A slot is cut into the side of the cylinder so that the position of the top of the movable plate may be observed. In calibrating the tester, a torque wrench is used to exert 200 ft-lb on the journal spring by turning the roof-bolt nut. The position of the top of the movable plate then is marked at the slot.

If an impact wrench can exert enough pressure to depress the spring until the top of the movable plate lines up with the calibration mark, the wrench is ready for more service in the mine.



IMPACT-WRENCH TESTER (left) is calibrated with a torque wrench to indicate a torque value of 200 ft-lb. An impact wrench in tip-top condition (right) will depress journal spring in the tester at least down to the calibration mark.

New O-B Splicer Easy to Install on Used Wire . . . Different Size Wires

Make Your Wire-splicing Problems a Pleasure with:

- 2-piece hollow screw splicer design that fits easily over trolley wire bends and burrs.
- Quick, easy splicing of two different size wires. (Takes but a minute to level them off with a file.)
- Splicer that provides smooth underrun with any size Figure 8, grooved, or No. 9 Section wire.
- Permanent holding strength up to 4000 pounds.

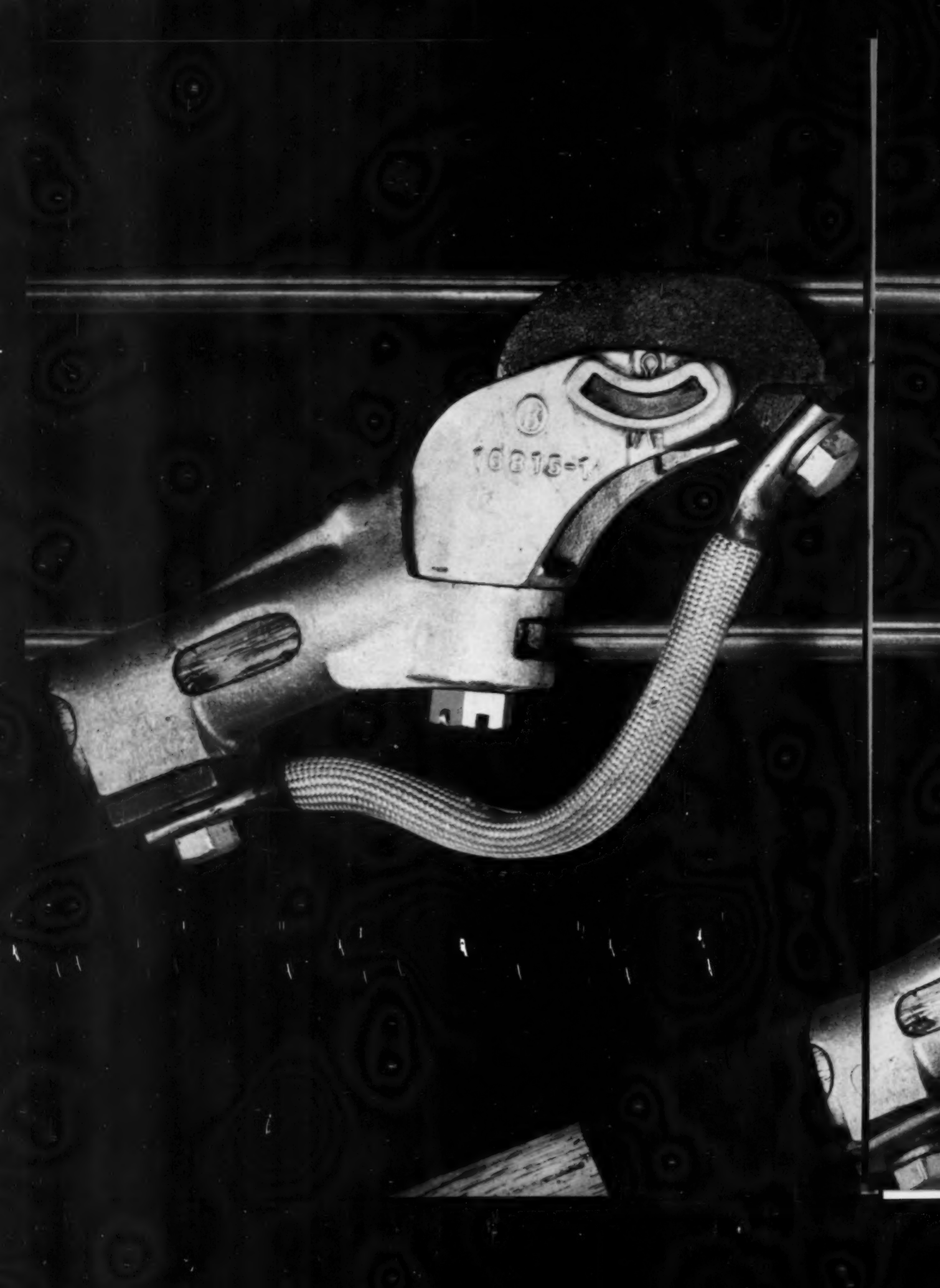
4 hollow screws tighten quickly and easily.

Ohio Brass

MANSFIELD OHIO, U. S. A.

IN CANADA: CANADIAN OHIO BRASS CO., LTD., NIAGARA FALLS, ONT.

Feeder and Trolley Materials • Control Materials • Trolley Shoes
Roof Bolt Shells and Plugs • Rail Bonds • Automatic Couplers



CURVED BEARING ON O-B SHOES

Reduces Arcing.. Saves Your Wire

- Curved bearing does away with tendency of shoe to tilt . . . keeps O-B Trolley Shoes in full contact with wire at varying heights, at high speeds, and over bumps.
- Proper depth of groove assures you of a positive "following action."
- Streamlined O-B design prevents any part of collector from snagging on your I-beams or cross beams.
- Exclusive fiberglass insulation on shunts withstands higher temperatures, saves you on heavy mechanical wear.
- O-B Type-L Shoe, at top, recommended for your mine locomotives operating on currents up to about 2000 amperes.
- O-B Type-M Shoe, below, with extended contact area and double shunt, recommended if you operate on currents in excess of 2000 amperes.

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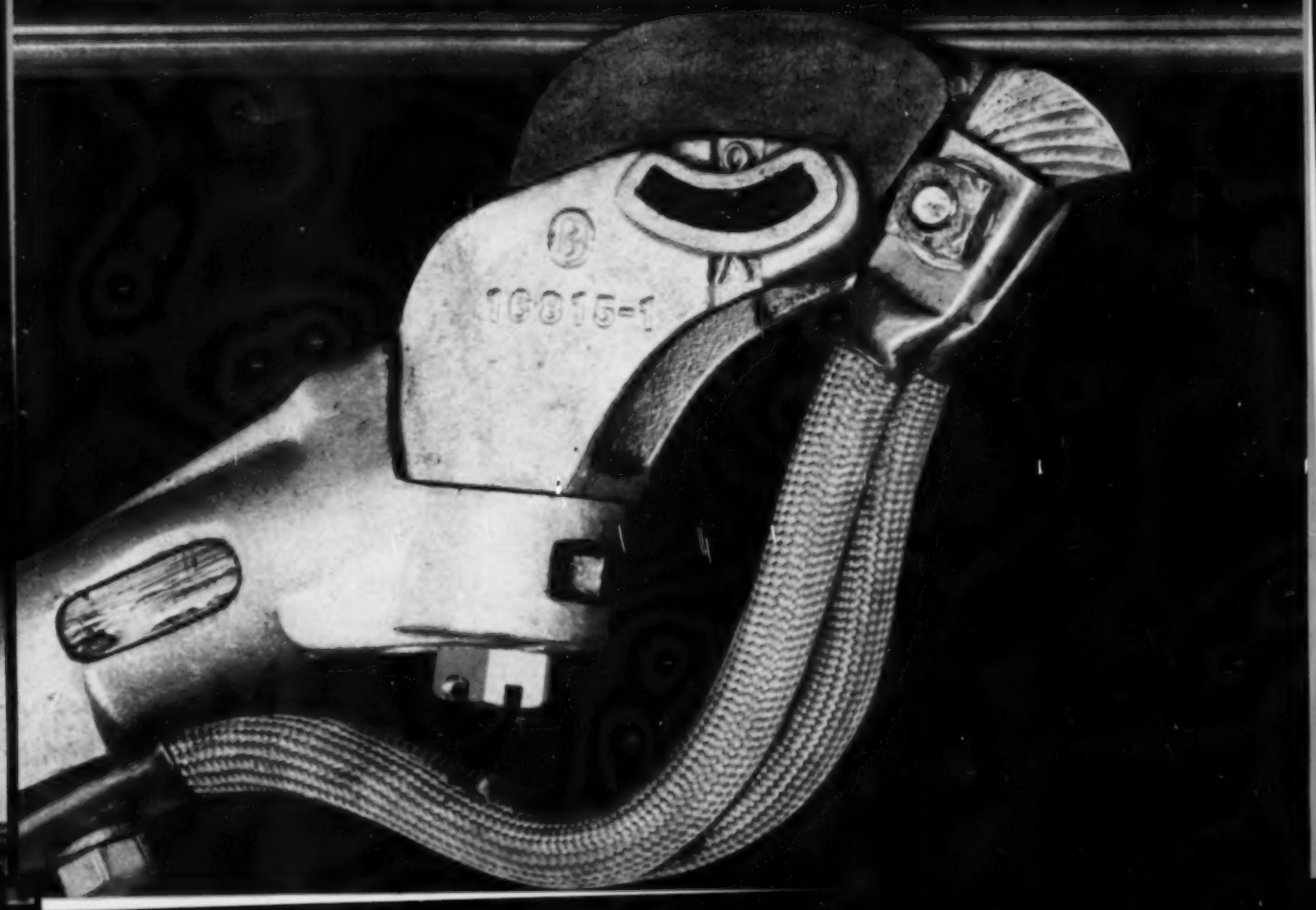

Why Take Guard Boards Down to Change Trolley Wire?

Use O-B Hollow Screw Clamp and Hexagon Wrench

- Two hollow screws on O-B Type-L-2 Clamp are easy for you to reach inside of guard boards with hexagon wrench.
- Because hollow screws are close to wire, Type-L-2 has unusually strong holding power for both vertical and side loads.
- Slim jaws allow easy shoe passage without any bumping or scraping.
- Low overall height of $1\frac{5}{8}''$ saves valuable headroom.

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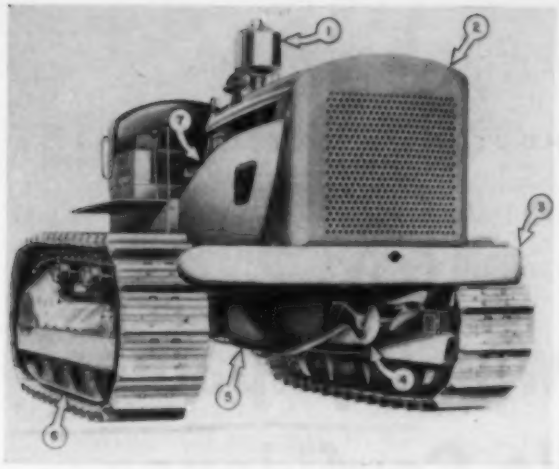
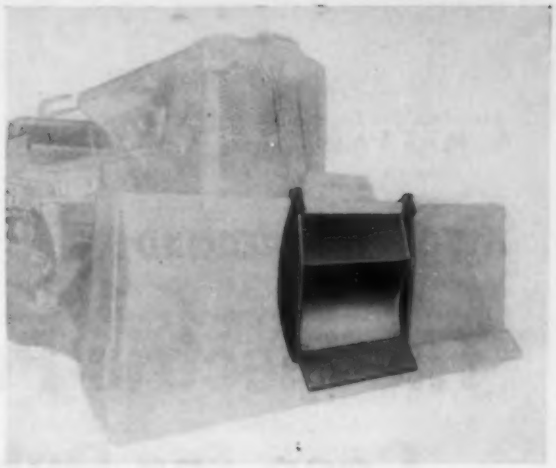
4492M





NOT ONLY more protection but greater adaptability in operation are the gains special attachments offer for track-type tractors. On this unit, for example, are: (1) spark arrester, (2) heavy-duty radiator guard, (3) front bumper, (4) front-pull hook, (5) crankcase guard, (6) heavy-duty track-roller guard and (7) upper engine guard. Push cup (right) protects blade and gives good in-line power for pusher tractor without interfering with blade's dozing ability.

Can You Get More From Your Tractors?

ARE YOU TAKING full advantage of the versatility your tractor unit offers?

The crawler tractor, for example, is not just a bulldozer or a simple prime mover, many owners have found after investigating the many attachments available. Manufacturers have brought out a variety of useful attachments ranging from front-end pull hooks to ether starting aids, in an effort to make the track-type tractor more versatile and to make its operation on the job easier.

The crawler tractor is often subjected to certain strenuous jobs that may in some way endanger the machine or a part of it. Or the owner may hestitate to use his tractor on a certain job for fear of damaging it. For such cases, there are special attachments designed to protect the machine and, thus, keep costly down time from breakage at a minimum.

CAN GUARD RADIATOR

For example, a heavy-duty radiator guard is a wise precaution against tree limbs and brush on certain operations. Or, if the tractor is operating under severe conditions, an extra heavy-duty track-roller guard will protect the track rollers from damage. Rocks and stumps also prove a working hazard and a crankcase guard is low-cost insurance against damage to the underpart of the engine and transmission. Various types of guards also are provided to protect the tractor engine from tree limbs or branches.

Often operations are near dry underbrush, timber or storage tanks of inflammable materials where a spark from the exhaust may prove very costly. A spark arrester has been developed that practically eliminates all danger from this source. And when operations warrant it, a muffler can be attached that will reduce exhaust noise.

RAIN TRAP GOOD INVESTMENT

To protect the tractor engine and to prolong its life, a rain trap on the exhaust stack is a good investment. Also, engine hoods and doors and radiator shutters or curtains will help control the engine temperature when the mercury hits bottom.

EASE LOAD ON AIR CLEANER

For that unusually dusty job, an air-cleaner pipe extension has been developed to relieve the air cleaner of some of the load and thus provide fresher air for the engine. As an extra precaution against lint, chaff or leaves, a pre-screener (standard precleaner with a length of wire mesh) is available.

SPECIAL TRACK-SHOES NEEDED

The crawler tractor is required to travel over many types of surfaces in performing its job and manufacturers have done considerable research to provide owners with special shoes that will adapt their machines to various surfaces.

Grousers of different sizes, skeleton shoes, snow and ice shoes, street plates and rubber shoes are but a few of the many types of shoes available for special jobs. Snow sprocket wheels and different track assemblies also insure the tractor's adaptability to unusual climatic conditions.

PUSH CUPS HELPFUL

Special attachments provided include push cups that give good in-line power for pusher tractors. Push cups may either be mounted to a U-frame in front of the tractor or attached directly to the dozer blade so that the tractor can be used not only as a pusher but also as a bulldozer.

A front pull hook also is available where heavy duty equipment is being towed and it is desirable to hook tractors in tandem. A front bumper may also be attached to protect the tractor radiator from heavy bumps or jolts.

MAKE OPERATOR COMFORTABLE

The comfort and convenience of the operator is too often overlooked in the operation of a track-type tractor. Various special attachments have been developed by manufacturers to remedy the situation. For convenience where a gasoline starting engine is used to start a diesel engine, an electrical starting unit may be attached to the starting engine. Or for extreme cold, there is an ether starting aid designed to assist starting of a diesel engine.

For the comfort of the operator, cabs have been designed to keep out the blizzards, sharp winds and other winter discomforts. A heater may be installed in the cab, and to shield the operator from the sun and provide shelter during showers or sudden downpours, a canopy top may be purchased.

Extra wide seats are available for the smaller tractors. Lights, too, are available for operation when a round-the-clock schedule must be maintained.

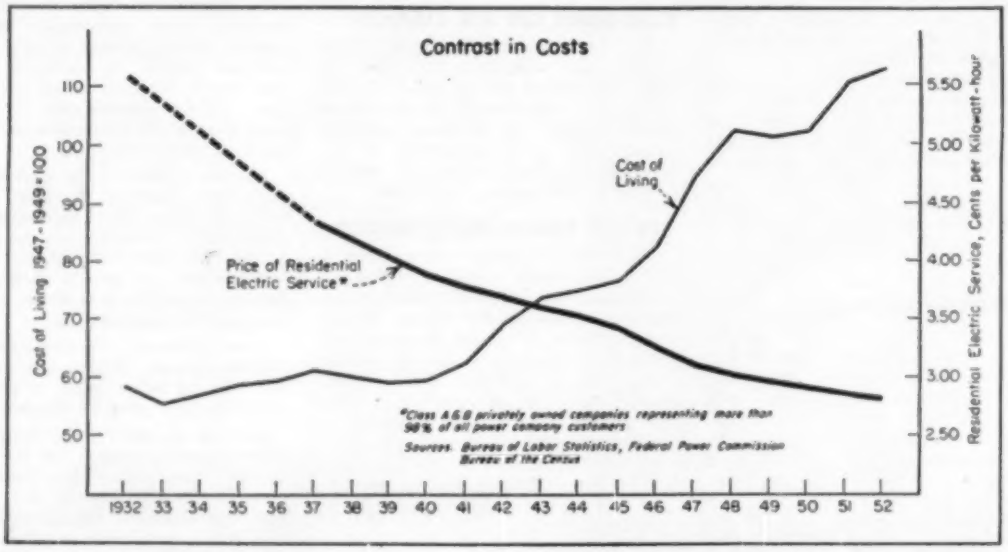
Keeping in mind three basic principles—greater protection for the tractor, greater versatility of the tractor, and greater operator comfort and convenience—manufacturers have sought to provide more and better attachments and thereby broaden the value of the prime mover to its owner.

IN CASE YOU MISSED THEM, you'll find 13 worthwhile "Operating Ideas" developed at the Freeman Coal Mining Corp. and the Pittsburgh Coal Co. in the feature section of this issue—on pages 82-83, 98-99 and 100-101.

A 20-YEAR RECORD . . .

The Electric Power Companies' Case for Public Confidence

An economic study of the record of the investor-owned electric power companies of the United States over the past twenty years underwrites their claim to public confidence today. A key factor of this record is set forth by the chart in the middle of this page. This shows that while the cost of living as a whole has almost doubled, the average price of electric energy for residential use in the United States has been cut in half.



The average prices of industrial and commercial power also are much lower than they were twenty years ago.

Such a study confirms the record on other key accomplishments of the electric power companies during the past two decades.

They have not failed, either in peace or war, to meet the nation's rapidly expanding electric power requirements. In paying tribute to the performance of these companies during World War II, J. A. Krug, Director of the Office of War Utilities, said, "Power has never been too little or too late." The same can be said for the entire period of the past twenty years.

To be ready with enough power – on time – the electric power companies have expanded their production fourfold since 1933. This has required an investment of over $17 billion in new facilities. To raise the funds for this investment they have enlisted the participation of about 3 million direct stockholders. Through life insurance companies, banks and similar institutions, about 90 million Americans – more than half of the nation's total population – have become investors in electric power companies. By thus relying on private investment for their expansion, the power companies have provided their

plant and operating equipment without burden on the taxpayer.

In addition, the investor-owned companies have paid about $12 billion in taxes to various governments – national, state and local – over the past twenty years. Unlike government-owned and -operated systems, they have received no public subsidies. When taxes and subsidies are taken into account, the rates for electricity charged by the investor-owned companies have been as low as, or lower than, those charged by government-owned and -operated systems.

Many Americans do not appreciate the job that the power companies have done over the past two decades. That is due, in part, to the public memory of financial abuses by some utility holding companies during the 1920's. This memory obscures a clear and unprejudiced view of the progress since those days. And some of the all-out advocates of reliance on government rather than on regulated private enterprise for the development of our power resources do their best to keep this memory of the past alive in the present.

An Impressive Case

Some special cases of electric power development may involve problems for which the investor-owned companies are unable to provide full solutions. This may be true, for example, of some large multiple-purpose projects that combine electric power generation with related developments such as the improvement of navigation, flood control and the irrigation of arid lands. Some of the economic and administrative problems imposed by such projects are not well adapted to effective handling by private enterprise. Flood control and the improvement of navigation, for example, usually involve the provision of much costly service over and above the cost of producing power.

It is true, however, that in some cases development of the electric power side of multiple-purpose projects by private enterprise may well be more feasible than would appear from statements by some government power advocates. And the record indicates that even in those projects on which both the power generation and the other services are handled by public authority, it may well be desirable to have the investor-owned companies assume the transmission and distribution functions.

Our study of the record of the investor-owned and -operated companies over the past twenty years has led us, of course, behind the statistics that bear on the wisdom of giving them a priority in the development of our power resources. It reveals that these enterprises are manned by people who, through lifetime experience, are peculiarly conversant with the needs of the communities they serve. They have given the consumer notably good service while conforming to standards set and enforced by public regulatory commissions. They have won the confidence of the investing public. By their nature and their experience they are competent to handle any power program that can be demonstrated to be economically sound.

The Paramount Public Interest

By their economic performance during the last twenty years, the electric power companies have earned the confidence of the public. By relying on these companies to meet its electric power requirements the public will fully protect its economic interest in ample and efficient service at fair prices.

That is where our study comes out. Our findings do not touch the political consideration that private operation of electric utilities under public regulation is a safeguard against further concentration of both political and economic power in a federal government that already commands too great a concentration. But if these findings make an economic case for preferring power development by tax-paying business as against power development by governmental agencies, they clear the way for an appeal to the paramount public interest in safeguarding our personal and political freedoms against the further encroachment of government.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nationwide developments that are of particular concern to the business and professional community served by our industrial and technical publications.

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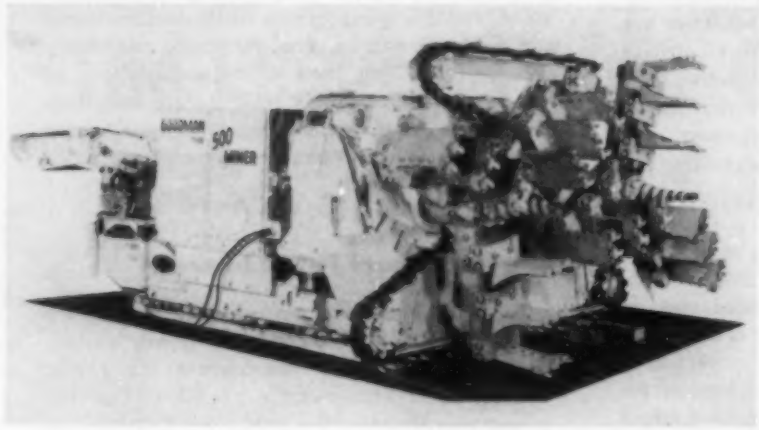
Donald C. McGraw

PRESIDENT

McGRAW-HILL PUBLISHING COMPANY, INC.

Equipment News

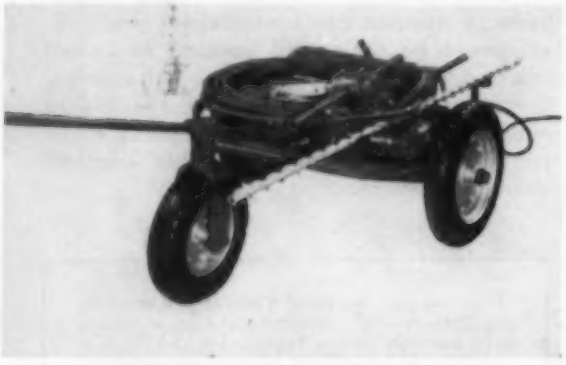
New-Type Miner Produces 7 TPM From 7-Ft Oval Cut (1)



The new Goodman continuous-type mining machine, shown here before shipment to an Illinois mine, is a mining-and-loading unit of the boring type said to be capable of producing up to 7 tons of coal per minute. Known as the Goodman Type 500 Miner, it has a fixed cutting height of 7 ft and feeds into the seam by traction of its treads, cutting and breaking out the coal with twin rotating units and a cutter chain. Dislodged coal is pushed to the center of the path by the rotating units and bulldozed onto the machine's chain conveyor. The Type 500 Miner makes an oval cut measuring 7 ft high by 13 ft 2 in wide at its centers, arched on both sides and at the top corners for strong roof support. The bottom is cut out at each side and completely cleaned for a wide, flat roadway, the maker reports.

Operating features cited by the manufacturer include the turning of crosscuts at 90 deg by maneuvering on independently controlled reversible treads and utilizing the full 80-deg side swing of the rear conveyor's tail section. The cutting units can be tilted forward, backward or to either side to follow seam irregularities, and retracting all cutting units provides 6-in clearance at the top, bottom and sides for withdrawing from a cut and for tramming. Additional clearance at the top can be obtained by lowering the entire retracted cutting unit. A 100-hp motor drives the cutting units and a 50-hp motor is utilized to power the hydraulic system controlling all other machine movements.

Other miners of a similar type, for lower and higher seams, and also a cutting head with a greater range of retraction for more flexibility where heavy cross bearings and posting are required, will be available later, Goodman announces. Circle No. 1 on the postage-free card facing p 124 for more information from the Goodman Mfg. Co., Chicago 9.

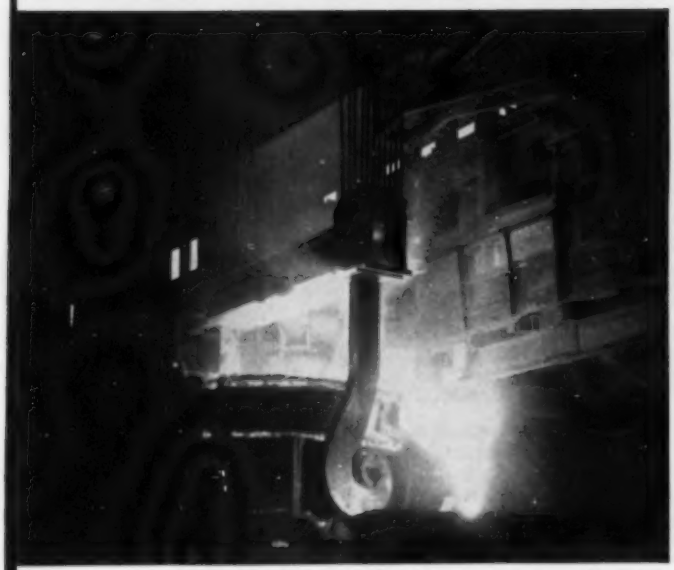


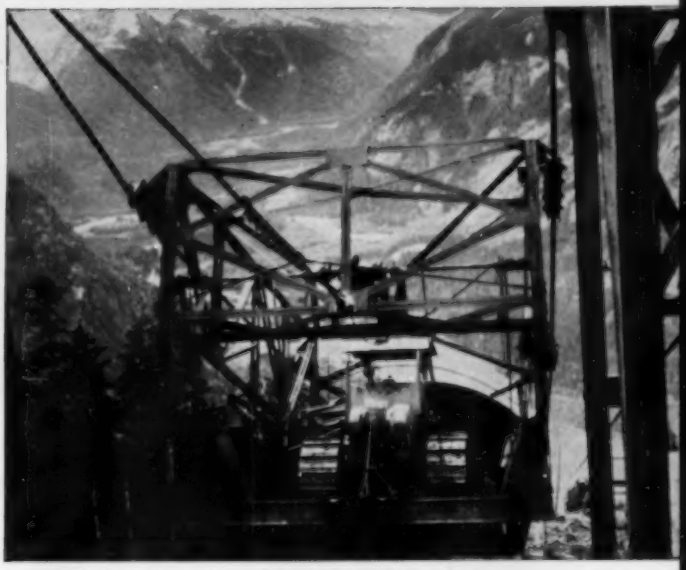
Mobile Unit Powers Coal Drill (2)

A new "Tricycle" hydraulic power unit now is available for use with the Schroeder hydraulic coal drill to provide a complete drilling unit for face operations that can be hand-propelled in all except the worst bottoms. Featuring light weight, sturdy construction and full maneuverability, the unit uses a simplified hydraulic system, a new tank designed for rapid cooling, and standard electrical equipment and other components which are light weight and easily maintained, the maker says. Complete with oil, drill, chuck and hoses, the unit weighs 615 lb. It is less than 22 in high, is approximately 60 in long and has a bottom clearance of 6½ in and a tread width of 36 in. Full details from Schroeder Bros., Pittsburgh 1, Pa.

High-Speed Trailer Hauls 33 Cu Yd (3)

The newly announced Athey PR21 rear-dump trailer, drawn by the Caterpillar DW21 tractor for which it was designed, can haul 33 cu yd of any material at speeds up to 20 mph. The trailer features a wide open-mouth body tapering from 9 ft 5 in at the front to 6 ft ½ in at the rear that makes an easy target for loading. Two Athey 3-stage hydraulic hoists lift the body to a 60-deg angle to spill the entire load and dumping can be as slowly as desired, with the operator maintaining full control. In dumping, the trailer's wheelbase of 19 ft 11 in shortens to 13 ft 4 in. Other trailer features cited by the maker include a 123-in tread for additional stability in high-speed hauling; a body of ⅜-in high-strength steel and a sandwich bottom of

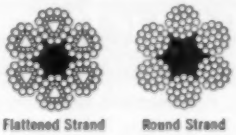




PROVING EXTRAORDINARY SERVICE—A Hercules Flattened Strand crane rope delivered 18 months service, compared to 6 months for ordinary rope. It performed equally well as a clamshell bucket rope. On a hot ladle crane it outlasted round strand rope by 4 to 1, and still tested at higher-than-rated strength. It was chosen for its super strength to haul the car on the continent's largest cableway at Kitimat.

Can Flattened Strand solve your special wire rope problem?

Hercules Flattened Strand is a special kind of wire rope that provides extraordinary service on special kinds of jobs.



Flattened Strand Round Strand

The key to the difference is the triangular shape of the strands. Notice how the strands support each other; how the rope circumference is almost perfectly round; and how the core is smaller. There is 10% more steel in Hercules Flattened Strand than in round strand ropes of the same diameter. That means *10% more strength* and *10% greater safety*. Flattened Strand wears longer and more evenly . . . and is easier on sheaves and equipment.

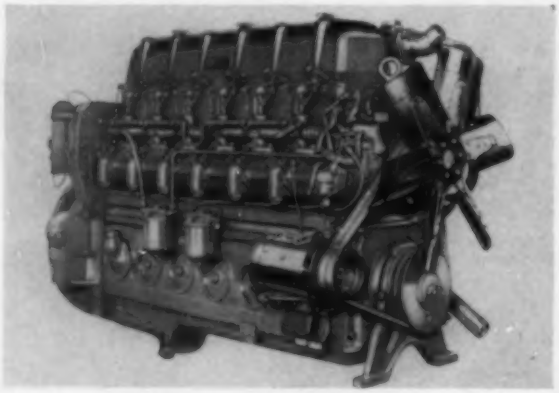
If you can use this Super-rope, you'll soon begin saving time, labor, money. Why not investigate?

Because Leschen pioneered and perfected Hercules Flattened Strand wire rope, Leschen is your best source of additional information. Ask your Leschen man, or write for "The Flattened Strand Story."

LESCHEN WIRE ROPE DIVISION
The Watson-Stillman Company
(A SUBSIDIARY OF H. K. PORTER COMPANY, INC.)
St. Louis 12, Missouri

LESCHEN
HERCULES Red-Strand
WIRE ROPE

¾-in armor plate, oak filler and ⅛-in bottom plate; all-welded frameless design that counteracts and absorbs twist and torque; and a body lip extending well to the rear of the tires to throw the load over the bank. The DW21 tractor is powered by a 225-hp 6-cylinder Caterpillar diesel engine and has a constant-mesh transmission giving gears ranging from 2.16 to 20 mph to match any ground or hauling condition. The Athey PR21 rear dump, which is interchangeable with the Caterpillar No. 21 scraper, is one of 10 units designed for use with Caterpillar rubber-tired tractors. Details from the Athey Products Corp., Chicago 38, or Caterpillar dealers.

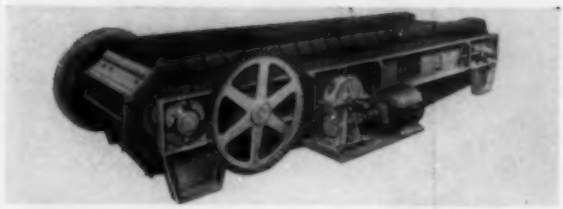


New Diesel Offers 36% More Power (4)

A complete, improved line of 2-cycle diesel engines featuring 36% greater power output has been announced by the P&H Diesel Engine Div., Harnischfeger Corp., Crystal Lake, Ill. The P&H C-18 engines range from 58 to 253 hp at 1,800 rpm and have a compression ratio of 16:1. There are 52 improvements in the basic engine cited by the manufacturer, including: better scavenging, new porting, redesigned combustion chamber, new alloy-hardened cast liners, maximum cooling efficiency, corrosion-resistant water jackets, improved timing, new injection principle, better lubrication and oil control. In addition to greater power, the new line offers more dependability, higher usable speeds, higher efficiency, more horsepower per pound and lower cost per horsepower, the company says. Details from P&H.

1½-Yd Shovel Follows New Design (5)

The American Hoist Model 750 shovel is a completely new machine rigged for all-purpose work and is rated at 1½ yd as a shovel, 35 tons as a crane and 2 yd as a clamshell or dragline, the maker reports. Among the features cited for the unit are single-purpose shaft assemblies which can be removed without disturbing one another; air control that lets the operator retain full feel of the load with minimum manual effort; special contracting-band clutches that need no adjustment; antifriction bearings in brake linkage which, with air-controlled clutches, reduce operating effort up to 60%; and machinery arrangement that leaves deck free and facilitates maintenance. Details from American Hoist & Derrick Co., St. Paul 1, Minn.



Apron Feeder for Heavy-Duty Service (6)

Apron feeder announced by the Eagle Crusher Co., Galion, Ohio, was developed primarily to handle stone, rock, coal and such heavy materials from hopper to crusher and features a design and construction that are said by the maker to fit it for especially heavy service. Utilizing interlocking steel or manganese plates ½-in thick, riveted to heavy roller chain, the Eagle feeder is 6 ft 1 in wide, 2 ft 10 in high, and is available in lengths from 6 to 14 ft. It is designed for either a direct chain drive with clutch or an independent electric drive with speed reducer. Details from the company.

Rubber-Tired Tractor Provides 150 Hp (7)

The new DW15 4-wheel tractor announced by the Caterpillar Tractor Co., Peoria 8, Ill., is powered by a Caterpillar 150-hp 6-cylinder D326 diesel engine and has a standard transmission giving double speed ranges for 10 forward speeds up to 24 mph and two reverse to 3.3 mph. Optional final drive gears permit speeds up to 31.3 mph. Features cited by the maker includes aluminum-alloy pistons, triple-duty oil pump for positive lubrication on steep grades, large-capacity wheel brakes designed to insure anti-jacknife protection and improved hitch construction for quick easy removal. Designed for use principally with the Caterpillar Nos. 15 and 10 scrapers and W10 wagon, the DW15 includes wagon controls.

Handy Checklist!

Tear out the postage-free card facing p 124 now and use it as a checklist in going over this month's Equipment News section (pages 120-132). Just circle the numbers of the items on which you want more information or free bulletins, fill in your name and address and mail the card. *Coal Age* will pass your request along to the respective manufacturers. There is no obligation involved, as the manufacturers are glad to provide you with detailed information and bulletins on their equipment.

Exposin' a Deep Down Vein

PIONEERING FOR POWER SHOVELS. The Osborne Mining Company gets its two big power shovels into the coal stripping act fast by using an INTERNATIONAL TD-24 to rip out a working bench on the side of this Kentucky mountain.

Two INTERNATIONAL TD-24s make stripping 30 feet of overburden pay off for Osborne Mining Company

There's a 26-inch vein of utility coal heavily blanketed by 30 feet of overburden in the hills around Corbin, Kentucky, but the Osborne Mining Company works that seam at a profit by using two big red INTERNATIONAL TD-24 crawlers to help send that thick layer of overburden spilling down the mountainsides in the least possible time.

Owner C. J. Osborne tells how he gets the job done: *"The continuous working performance of my first TD-24 sold me on buying a second TD-24 a year later. The first TD-24 has run 18 months now with repairs totalling less than $300. We run into plenty of rough stuff in this operation, but nothing that 'Big Red' can't move and move fast. What's more, I've never had a roller or final drive go out, and that's something on this kind of work!"*

That's strong talk from a mine operator who really knows his power tools. But your INTERNATIONAL Industrial Distributor will provide additional power proof—by demonstrating a TD-24 or any other INTERNATIONAL crawler you say wherever and whenever you desire. Call him today. You'll operate more profitably tomorrow.

INTERNATIONAL HARVESTER COMPANY, CHICAGO 1

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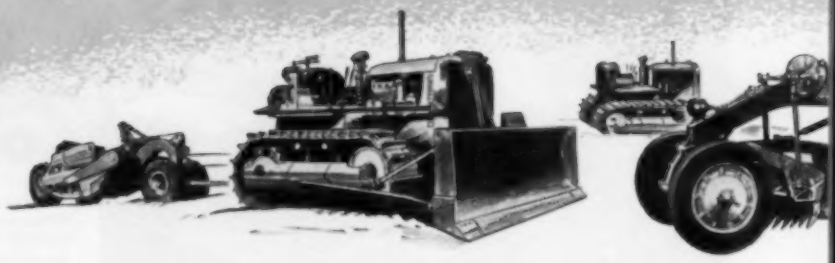

Your Caterpillar Dealer now offers you a "BONDED BUY" on used Caterpillar-built equipment backed by a bond of $10,000, issued by The Travelers Indemnity Company. He gives you this protection when you purchase a "BONDED BUY" machine.

This is the *first* time in the heavy-duty machinery field that such an offer has ever been made!

You are also offered two other classes of used equipment buys—"Certified Buy" and "Buy and Try." These cover used units of *any* make.

What does this mean to you? *It takes the guess and gamble out of buying used equipment.* You know what you're getting. Your assurance is in writing. What's more, *no matter what your needs, cost-wise or work-wise,* you have a *choice* to meet them.

Only your *Caterpillar Dealer* offers you this across-the-board selection. The best source of new machines, he's also your best source of used machines. Whether you're in the market for one, a few or many, he's the man to see for your *best* buy. See him today for complete details on guaranteed used machines!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

DON'T GUESS OR GAMBLE ON USED EQUIPMENT

You KNOW what you're getting at your CATERPILLAR DEALER

Your Caterpillar Dealer offers you three clear-cut classes of used equipment. He backs each one in writing. You buy with confidence, sure that the equipment is honestly described. See him for the best values on the market!

(1) "BONDED BUY" Only the best in used Caterpillar-built equipment. Each "BONDED BUY" machine is backed by a Dealer's Guarantee Bond equal to the purchase price of the machine up to a maximum of $10,000. This provides a guarantee for thirty days against unsatisfactory performance due to defective parts. If a part should prove defective within the guarantee period under the normal conditions of your job and with proper maintenance, your dealer will put your machine back into operating condition *with no charge to you for parts and labor* up to the amount of the bond. The Dealer's Guarantee Bond is backed by The Travelers Indemnity Company. Your Caterpillar Dealer gives you this protection with your purchase of a "BONDED BUY" machine. Look for the "BONDED BUY" symbol—it's your assurance of the best in used equipment.

(2) "CERTIFIED BUY" Next best buy in used equipment! "Certified Buy" covers machines of any make in good condition. Your performance guarantee is in writing backed by your Caterpillar Dealer.

(3) "BUY AND TRY" Bargains in used machines of any make. Buy and try them for a period mutually agreed upon by you and your Caterpillar Dealer. Each "Buy and Try" machine carries his written "money-back" agreement.

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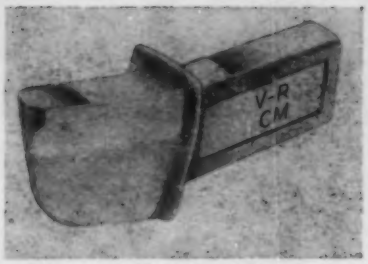
BEST BUYS IN NEW AND USED EQUIPMENT

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Copr. 1954, C. T. Co.



NEW BIT EASILY LOCKED INTO CUTTER CHAIN (8)

New CM cutting bit solves the problem of inserting and holding the bit in a cutting chain, according to Vascoloy-Ramet Corp., Waukegan, Ill. The shank of the new bit provides a tapered recess to receive the end of the set screw, thus eliminating the necessity of "biting" the screw into the shank to hold the bit in place. The set screws can be sufficiently tightened by hand with an ordinary wrench to eliminate broken set screws and to permit easier bit changes. The shank of the new bit also is heat-treated and stress-relieved to eliminate shank breakage, the maker says.

"WHEELBARROW" PUMPS FOR ONE-MAN HANDLING (9)

New line of diaphragm pumps in 2-, 3- and 4-in sizes, powered by air-cooled gasoline engines or electric motors, may be obtained with wheelbarrow, two-wheel or baseplate mounting. Wheelbarrow mounting features a single rubber- or steel-tired wheel and a pair of folding handles. The units are self-priming and will handle water containing high percentage of mud or sand, the manufacturer states. A 4-in wheelbarrow unit, weighing about 300 lb, is rated at 3,000 gph at a 20-ft lift using a 5-hp gasoline engine. Full details available from Rice Pump & Machine Co., Belgium, Wis.

YES—I would like more information . . .

Please send me catalogs or further information about the items from the Equipment News Section whose numbers are circled. (Apr., 1954)

1	6	11	16	21	26	31	36	41	46	51	56
2	7	12	17	22	27	32	37	42	47	52	57
3	8	13	18	23	28	33	38	43	48	53	58
4	9	14	19	24	29	34	39	44	49	54	59
5	10	15	20	25	30	35	40	45	50	55	60

In addition, please send me data on these OTHER products advertised in this issue (give name and page number) .....

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Company .....

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FREE BULLETINS AVAILABLE

(10) BELT SPLICING AND REPAIR—A 32-p manual that tells how to splice and repair conveyor and elevator belting is offered by the B. F. Goodrich Co., Akron, Ohio. A series of 42 photos are used to illustrate, step-by-step, proper belt-splicing procedure and the manual describes splicing materials, tools needed, best conditions, methods of splicing cord and fabric belts and special procedure in splicing rayon belts. Also included are detailed instructions for on-the-job vulcanizing with portable vulcanizers, use of Quick-Lock temporary repair material, a description of vulcanizing equipment, a chart showing quantities of splicing materials needed for any specified job and several new tables developed especially for this manual.

(11) SURFACE-MOISTURE TESTER—New H. & P. bulletin describes the simplified operation and application of the Olivo moisture meter, said to accurately determine surface moisture of powdered, granulated or fibrous materials in less than 2 min. Bulletin is available from Heyl & Patterson, Inc., Pittsburgh 22, the exclusive distributor.

(12) CENTRALIZED LUBRICATION—Trabon Engineering Corp., Cleveland 3, Ohio, offers Bulletin A-1-54 describing its line of Hydra-Lube pumps and reservoir assemblies, designed for automatic lubrication of hydraulically powered equipment, such as mining machines, machine tools, etc. The method of connecting the Hydra-Lube to the supply line of any double-acting cylinder without need of control valves to prevent mixing of lubricant and hydraulic fluid, dimensions and other data are fully covered.

(13) V-BELT CALCULATIONS—New A-C bulletin explains a new method of calculating the horsepower capacity of a "Texrope" V-belt drive. The belt ratings resulting from this new method consider effect of belt length, ratio of the diameters of both the driving and driven sheaves upon the horsepower rating of the belt, and resultant belt life—features which were not adequately reflected in the former V-belt ratings. The advance bulletin, "Guide for Figuring 'Texrope' Drives," 20B6956B, is available from Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

(14) MINE-TRACK ACCESSORIES, including rail splicers, skids, derails, re-railers, transition rails, switch connectors, switch signals, etc., are pictured and described in bulletin offered by the Miners' Hardware Supply, Pittsburgh 21.

(15) BIT GRINDERS—Bulletin E-10 provides application and design details on the Blount detachable-bit grinders, both bench and floor types, with either electric, gasoline or air drives. Available from the J. G. Blount Co., Everett 49, Mass.

(16) FOR MAINTENANCE MEN, the L. S. Starrett Co., Athol, Mass., offers its 334-p Catalog 26-A illustrating and describing its entire line of mechanics' tools. Specifications, sizes and details are provided on a wide range of steel tapes, gages, calipers, hacksaws, dial indicators, precision tools, etc.

(17) POWER TRANSFORMERS—Standardization of core-form power transformers is discussed in a new 40-p Booklet B-5914 available from Westinghouse Electric Corp., Box 2099, Pittsburgh 30. Technical in nature, the reference-type booklet relates developments in construction, materials, and operation of Type SL power transformers to the benefits the user derives from standardization of the various components, and also describes various standardized processes used during manufacture.

(18) TRACTORS, SCRAPERS, ETC.—The complete line of Allis-Chalmers industrial equipment is pictorially described in the newly revised 36-p general line catalog "Presenting the Allis-Chalmers Line." Described along with its crawler tractors and wheel tractors and motor graders, is A-C's line of motor scrapers and wagons, and the expanded line of pull-type scrapers, a 10-p section is devoted to the selection of allied equipment and field-proved attachments engineered for use with A-C equipment. Offered by the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis.

(19) CONVEYOR BELTS—A new 30-p catalog dealing specifically with industrial rubber conveyor belting is offered by Hamilton Rubber Mfg. Corp., Trenton 3, N. J. Entitled "Conveyor Belts by Hamilton," the catalog shows many typical belting installations with informative technical data on belting constructions, belt covers, breaker fabrics, etc.

(20) FIRE-SPRINKLER SYSTEMS—Booklet, "Fire Can Destroy Your Business," points out that 43% of the firms

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whose records are lost in fires never reopen and an additional 28% quit business within 3 yr. The bulletin stresses the fact that the 50 to 90% reduction in fire insurance costs from installation of a Blaw-Knox automatic fire-protection system will pay the cost in 5 to 10 yr, and covers the various types available, such as water, fog, foam, and carbon dioxide, with details of the new Blaw-Knox spray sprinkler. Bulletin 2426 offered by Blaw-Knox Co., Automatic Sprinkler Dept., Pittsburgh 33.

(21) **DRIVE CHAIN**—Bulletin 53-56 from Chain Belt Co., Milwaukee 1, Wis., fully describes "Rex Z-Metal Chain" of special heat-treated, alloyed ferrous metal, said by the maker to have physical properties equal to better grades of steel while reasonably low in cost, to resist corrosion and abrasion and to be considerably harder than malleable iron, unusually ductile and readily machinable. User benefits, laboratory tests and applications are covered in detail.

(22) **DIESEL ENGINES**—New series of specification bulletins covering the full line of P & H 2-cycle diesel engines gives condensed information and specifications for each model in the line, from 20 to 138 hp, 2, 3, 4, and 6 cylinders. Offered by Harnischfeger Corp., Diesel Div., Crystal Lake, Ill.

(23) **ELEVATOR BELTING**—24-p engineering handbook on elevator belting, offered by The B. F. Goodrich Co., Akron, Ohio, describes and illustrates types of belt bucket elevators, gives factors for belt selection and procedures for engineering the correct belt, and describes belt-construction features. Included in a section on belt installation are bucket spacing and belt punching, tables of standard buckets, methods of belt splicing, elevator belt take-up, pulley lagging and various engineering data tables.

(24) **MOTOR GRADER**—26-p Catalog MS-451 covering the mechanical features and specifications of its Model D motor grader is available from the Tractor Div., Allis-Chalmers Mfg. Co., Milwaukee 1, Wis. Applications, design and construction are illustrated and described in detail, with full data.

(25) **STEEL FABRICATION**—Booklet available from the R. C. Mahon Co., Detroit 34, Mich., covers the Mahon "Steel-Weld" fabrication and machining facilities for a wide variety of parts and assemblies, with special attention to heavy, cumbersome work of unusual dimensions. Many typical applications of Steel-Weld fabrication to unusual problems of machinery construction are illustrated and described.

(26) **SHEAVES**—Booklet discussing features and advantages of Browning Gripbelt sheaves with malleable split-taper compression bushings includes dimensions, specifications, installation, etc. Offered by the Browning Mfg. Co., Maysville, Ky.

(27) **ELECTRIC HOISTS**—Bulletin QL on Coffing Quik-Lift electric hoists covers performance and safety features, construction details, complete specifications and dimensions of all 17 Quik-Lift models from 500- to 4,000-lb capacities, together with various electric-hoist accessories. Available from the Coffing Hoist Co., Danville, Ill.

(28) **BIN INDICATORS**—New 20-p catalog offered by the Bin-Dicator Co., Detroit 15, Mich., describes its complete line of pressure-actuated bin-level indicators which, if required, also actuate various types of signals, such as horns, bells or lights at the installation or at some remote point, and are frequently used to start and stop loading and filling machinery, as required by the level of the material in the bin, silo or chute. The catalog covers complete installation data for various types for thick or thin-walled bins, inside or outside locations and suspended interior installations.

(29) **TRACTOR-LOADERS**—Bulletin L-8950 describes the Austin Overshot loader, Models 4-C and 6-C, engineered for use with Caterpillar D4 and D6 Tractors, respectively. The 4-C has a 1½-cu yd bucket capacity, the 6-C 2 yd, and both models are hydraulically operated. Bulletin from Austin Div., Central Ohio Steel Products Co., Galion, Ohio.

(30-35) **FIRE FIGHTING**—Ansul Chemical Co., Marinette, Wis., offers several technical bulletins, as follows: Circle 30 on postage-free card for Bulletin 1, discussing effect of packed dry chemical on operation of Ansul dry-chemical fire extinguishers. Circle 31 for Bulletin 9, effect of Ansul dry chemical on electric motors and generators. Circle 32 for Bulletin 28, nitrogen as an expelling agent for dry chemical fire extinguishers. Circle 33 for Bulletin 29, temperature-correction chart for checking pressures of 110- and 220-cu ft nitrogen cylinders. Circle 34 for Bulletin 30, temperature-correction chart for checking pressures of 400-cu ft nitrogen cylinders. Circle 35 for Bulletin 31, carbon-dioxide cartridges.

(36) **PORTABLE DRILLS**—Truck-mounted Speedstar and Keystone units for water-well and other drilling in diameters from 3 to 24 in are fully described, with detailed specifications, in bulletin available from Stardrill-Keystone Co., Beaver Falls, Pa. Included in the five units covered is a combination machine for drilling by either the rotary or cable-tool method.

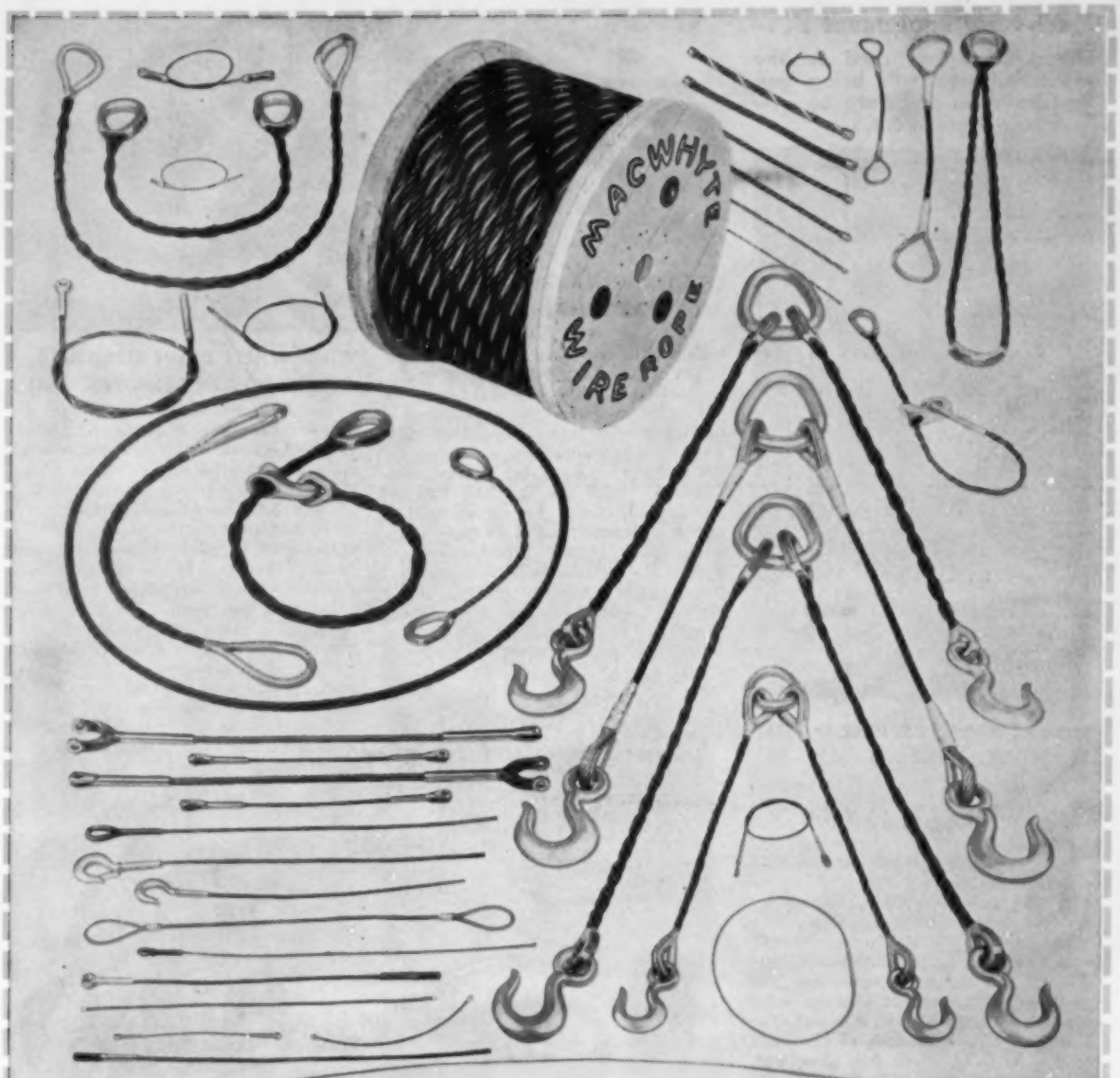
(37) **ELECTRICAL METERS**, electrical test equipment and special industrial-type controls are extensively covered in 190-p Instruments Catalog 54 available from the Electro-Tech Co., New York 13. Sizes, specifications, applications and features, etc., are provided on a wide range of electrical and electronic industrial meters and controls.

(38) **ALLOY-STEEL SCREWS** of various types for a wide range of applications are fully covered in Catalog 50 available from the Mac-it Screw Div., Strong, Carlise & Hammond Co., Cleveland 13. Detailed dimension data, physical properties and cross-sections are provided for the entire Mac-it line.

(39) **AIRLINE VALVE**—Bulletin 509-D describes application and construction of the Pennsylvania "Airchek" valve for use on compressed-air and gas lines, which is said by the maker to offer better operation, longer trouble-free service and lower cost. Available from the Pennsylvania Pump & Compressor Co., Easton, Pa.

(40) **PIPE MACHINES**—New 16-p power machine catalog provides full data on operation and application, specifications, dies and accessories available for five Beaver pipe machines and power drives, plus the new "55" universal nipple chuck. From Beaver Pipe Tools, Inc., Warren, Ohio.

(41) **VALVES**—Series 800 diaphragm motor valves with Saunders bodies, the pinch-cock design that is said by the maker to assure tight shutoff of slurries, viscous or volatile substances, are described and illustrated in Honeywell's new Specification Sheet 410-2, with full construction details and features. Offered by Industrial Div., Minneapolis-Honeywell Regulator Co., Philadelphia 44.



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More New Equipment . . .

The postage-free card on the previous page will bring you free bulletins and data on new equipment.

MOBILE DRILL FOR FAST BLASTHOLE DRILLING (42)

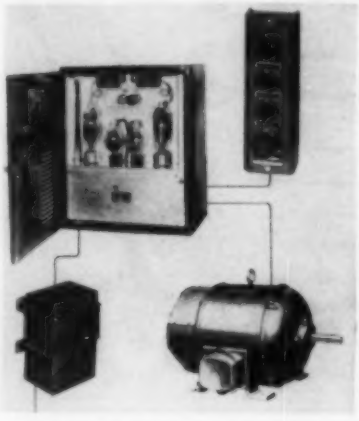
The Failing Model CBH Holemaster is a sturdy, compactly built, highly mobile drill combining a hydraulic chain feed with use of compressed air for removing cuttings and is designed especially for the fast drilling of vertical blastholes, the maker reports. Completely self-contained and requiring no auxiliary equipment, the drill is simple in design, with the few controls conveniently grouped for fast, safe operation, and produces clean, straight uniform holes that are easily positioned, it is said. The CBH has a rated capacity of blastholes to 400 ft, using 2⅞-in drill pipe, with hole diameters varying from 4¼ to 6¼ in depending on formations and depth. Bulletin 5401F13 from the George E. Failing Co., Enid, Okla.

BIN-LEVEL INDICATOR USES RADIO SIGNAL (43)

"Robintronic" level indicator, an electronic device developed by Hewitt-Robins, Inc., Stamford, Conn., uses a radio signal to indicate the level of stored material in preventing accidental overfilling or emptying of bins, tanks, silos and other storage units. Offered for use in coal and other industries, the Robintronic consists of a small radio transmitter housed in a steel probe which is placed at the level where the flow of material is to be controlled. When the stored material rises to envelope the probe or drops to expose it, the change in density distorts the signal being broadcast to the remote-control unit, and this change actuates an alarm or flow-regulating mechanism.

LOADER FEATURES VISIBILITY AND VERSATILITY (44)

Baker-Lull Shoveloader Model 20 with a 12-cu ft bucket lifts 1,500 lb to a height of 7 ft, has a 90-in turning radius, and may be readily converted for use as a fork lift or crane. The bucket is suspended low for better forward visibility and the boom arms remain forward of the operator at all times. The gasoline-powered Model 20 has four forward speeds and one reverse speed and a maximum travel speed of 14 mph. Catalytic equipment for handling exhaust gases is optional; the unit comes equipped with a spark-arresting muffler and a Protectoseal fuel tank. Specifications and complete description available from Baker-Lull Corp., Minneapolis 20, Minn.

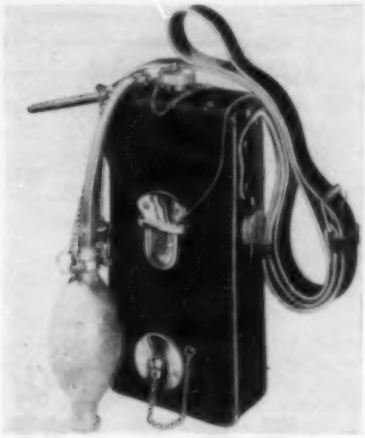


STEPLESS ELECTRONIC CONTROL FOR ADJUSTABLE SPEED (45)

Select-A-Spede, a new stepless, electronic control for close control of adjustable-speed motors, is designed to operate from AC power lines and is available with DC motors in standard NEMA frame sizes from ¾ to 15 hp. Speed regulation as close as plus or minus ½% is possible using optional tachometer feedback equipment. Optional control features include inching, jogging, controlled acceleration and deceleration, dynamic braking and reversing elements, with simple circuits designed for long life and dependability under severe industrial conditions. Safety features include a failsafe circuit for electronic tubes and current-limit control to safeguard driven machine and drive motor from overload, jamming or too-rapid acceleration. Full information in Bulletin 1500 available from Louis Allis Co., Milwaukee 7, Wis.

FOUR WHEEL DRIVE LOADER OFFERS POWER STEERING (46)

Transo front-end loaders, 1-cu yd Model TFL-100 and 1½-cu yd Model TFL-150, operate with a patented bucket-rocking motion for faster loading without tire spinning or undue strain, according to Le Roi Co., Milwaukee, Wis., the manufacturers. The rocking motion is actuated by the hydraulic lift and bucket cylinders. Top speed is 18 mph and the 4-wheel drive makes it possible to work in soft material or over rocky terrain. For easier maintenance, the engine, torque converter, clutch and transmission are grouped at the rear of the unit. Spring-loaded clutches, outside the transmission where they can be replaced in less than an hour, cushion loading shocks. Bulletin available from the manufacturer.



2½-LB METHANE INDICATOR READS TO 0.1% (47)

Employing the principles of optical projection in determining methane content, the Riken methane indicator, distributed in this country solely by National Mine Service Co., requires only a single flashlight cell and bulb and a replaceable absorbent cartridge for removing moisture from the sample in making combustionless determinations. The USBM-approved unit weighs 2½ lb and measures 7½x3½x1½ in, and enables one without special training to make readings in less than a minute accurate to within 0.1%, the distributor says. Descriptive literature available from National Mine Service Co., Beckley, W. Va.

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Every Duff-Norton Ratchet Jack is guaranteed at full capacity for loads applied to either head or foot lift.

Regardless of the type or kind of mining machinery or equipment that requires lifting, lowering or pushing, there's a safe, dependable, precision-made Duff-Norton Ratchet Jack that will do the job faster, easier, with less physical effort. The jacks shown here are only a few of the many Duff-Norton Ratchet Jacks designed and made expressly for rough, tough, day in and day out service in and around coal mines. All have the exclusive patented Duff-Norton *easily replaceable*, adjustable spring mechanism for long, positive, trouble-free service.

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TREATED MINE TIMBERS

This may sound like a sucker bet, but don't take the guy up on it because we can PROVE IT in one year. Here's how YOU CAN WIN the $50,000! If you deep-mine 200,000 tons of coal annually, YOU can save your company 25¢ per ton or $50,000 per year by switching to OSMOSE TREATED MINE TIMBERS NOW!

Whether you buy them from us or treat them yourself with our materials, Osmose Treated Mine Timbers are impervious to all types of rot, decay and termites and LAST UP TO FIVE TIMES LONGER! Mine timbers are EXPENSIVE today, but when you compare this cost with the cost of REPLACEMENT LABOR, you begin to see why Osmose can save you such a tremendous amount. Comparable savings are possible for larger or smaller tonnages. We are VETERANS in the coal mining field and have been specialists in Mine Timber problems for years! Successful coal operators everywhere will be glad to tell you that for long range EFFECTIVENESS and real ECONOMY . . . you can't beat Osmose Treated Mine Timbers.

ALSO . . . Ask us about M-T-M (Mine Timber Mix) for spot application.

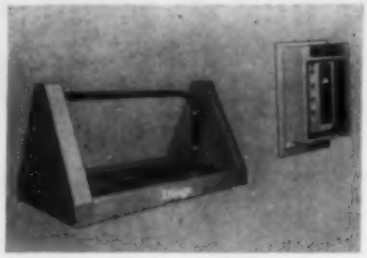
WHY

DO THE NATION'S LEADING COAL MINING COMPANIES USE OSMOSE *Treated* TIMBERS?

Here's the report from: POCAHONTAS FUEL COMPANY, INC. "Our Company has been using Osmose timber treatment, at the various mines, since 1942. We feel that sufficient time has now elapsed to prove the worth of your treatment, and are pleased to advise that it has been very satisfactory to us."

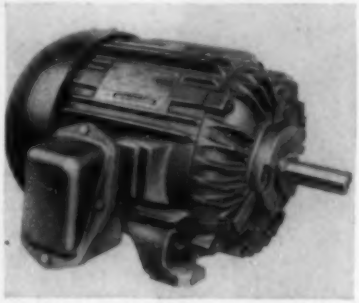
WRITE FOR COMPLETE DETAILS on the type of Osmose service you prefer

OSMOSE WOOD PRESERVING COMPANY OF AMERICA, INC.
980 ELLICOTT STREET • BUFFALO 9, N. Y.
Representatives in Pittsburgh, Denver, Birmingham, Ala., Charleston, W. Va. and Harlan, Ky.



ELECTRONIC METAL DETECTOR FOR TRAMP IRON (48)

New Dings electronic detector signals the presence of metals on conveyors carrying deep burdens. A wide range of signal and reject arrangements is available to provide automatic detection with manual, semi-automatic or automatic rejection. Bulletin B-1920-A available from Dings Magnetic Separator Co., Milwaukee 46, Wis.



NEW SQUIRREL-CAGE INDUCTION MOTORS IN SMALL FRAMES (49)

A redesigned line of AC induction motors in NEMA Frame-Size 326 and smaller is announced by Allis-Chalmers, General Machinery Div., Milwaukee 1, Wis. Based on advances in metallurgy and insulation, the new motors feature smaller frames for given power rating. Fan-cooled and explosion-proof models in Frame Sizes 182 and 184 will be available initially, according to the announcement.

DRIVE BELTS DESIGNED FOR BETTER GRIP, LESS SLIP (50)

Browning Super GripBelts, designed for minimum stretch, contain built-in static-conducting compound and are made of neoprene in carcass and cover for resistance to oil. Fewer belts per drive, lower bearing pressure, lower cost and non-sparking properties are cited by the manufacturer. Supplement V-136-E available from Browning Mfg. Co., Maysville, Ky.

ON- AND OFF-HIGHWAY TIRE FOR LONGER WEAR (51)

B. F. Goodrich All-Purpose truck tire is built on patented nylon shock shield with an extra shock shield under tread to prevent bruise breaks. Tire is offered for trucks which travel mostly on highway but which need extra traction for short trips off highway. Tread is 30%

CUT WHEEL REPLACEMENT COSTS AT LEAST- 56%

with the revolutionary sterling plan

No additional capital outlay necessary!

Alert mine operators are always searching for new ways, new methods to reduce overhead and operating costs. One way they've found is to follow the STERLING Plan. For example, without spending a dollar more, you can re-wheel with STERLING cast steel wheels and save *at least 56 per cent in wheel replacement costs!*

STERLING cast steel wheels have uniformity of hardness *throughout*. In fact, they work-harden with each trip. This means less expensive, safer, more dependable transportation. STERLING cast steel wheels are precision balanced, and they *stay* in balance, preventing worn spots, eliminating load vibration. The STERLING Plan shows how *you* can cut operating costs substantially. Write for your copy of the STERLING Plan, today!

This new cast steel mine wheel reduces down-time losses, cuts repair labor costs!

SAFER •
STRONGER •
MUCH LONGER WEAR •
COSTS LESS—*in the long run!* •

THE sterling PLAN *will show you how much you will save!*

sterling
STEEL CASTING COMPANY
EAST ST. LOUIS • ILLINOIS

Gentlemen:
Of course I want to cut my wheel replacement costs. Send me the STERLING Plan right away. (No obligation, of course.)

Name_____
Title_____
Company_____
Address_____
City_____ State_____
No. of mine cars now in use_____

REPRESENTATIVES
Ames A. Culp, 930 Second Ave., North — BIRMINGHAM 4, ALA.
Marshall Equipment Co., 1842 Enslow Blvd. — HUNTINGTON, W. VA.
R. A. Thompson, Hotel Madison — MADISONVILLE, KY.
J. S. Mosser, 720 Boosiawn Ave., Mt. Lebanon — PITTSBURGH, PA.
Western Sales Engr. Co., 375 S. West Temple St. — SALT LAKE CITY, UTAH
Service Supply Co., James Smith, Newbey Building — WHEELING, W. VA.

Mail this coupon today!

THE MARK OF AN
EXTRA DEPENDABLE
MINING MACHINE

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ELECTRO DYNAMIC

The red "power spot" on mining machinery means *powered by Electro Dynamic*, the most dependable motors *ever* available to industry.

For *proof* of this *extra dependability* send the coupon below for your copy of **"MOTOR SHOWDOWN"**, a new candid report on comparative results of motor performance tests* conducted in accordance with A.I.E.E. standards.

*Tests certified by J. Arthur Balmford, Professor of Electrical Engineering at a leading Eastern university.

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1 to 250 hp. AC and DC. Standard or special purpose. N.E.M.A. standards.

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155 Avenue A, Bayonne, New Jersey

Please send me a copy of "MOTOR SHOWDOWN" and the new catalog of Electro Dynamic industrial motors.

ED MOTOR SHOWDOWN

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COMPANY_____
ADDRESS_____
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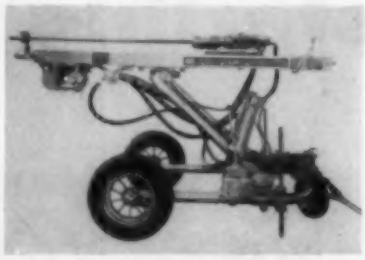
deeper, a center wear bar reduces rate of wear in the center and V-shaped grooves which widen at shoulder of tread help stone-ejection action. Buttons on alternate cleats help prevent skids and slippage.

POWDERED METAL INCREASES WELDING SPEED (52)

Powdered metal in the coatings of welding electrodes materially increases welding speed, according to Lincoln Electric Co., Cleveland 17, Ohio, manufacturers of Jetweld electrodes. Presence of the powdered metal permits increased current to be used since the powder in the coating is melted in the increased heat to provide an additional source of metal at the weld.



WAGON DRILL FOR EASY HOLE SPOTTING (53)

Said by the maker to eliminate much of the time and effort required for spotting holes, the new Gardner-Denver Model URM consists of a 4-in drill taking 8-ft steel, RM chain feed and a new drill wagon equipped with two hydraulic lifts that quickly raise or lower the U-bar while the drilling mast is being maneuvered into position. The drill, controlled by a single control handle for all operations, combines fast and powerful hammer action with steady rotation which, with hole cleaning at full line pressure and a powerful pull for extracting steel, permits the URM to save deep holes that otherwise might be lost in broken ground, the company reports. Details from Gardner-Denver Co., Quincy Ill.

25 MODELS IN LINE OF TRACK SCALES (54)

Its line of new four-section straight-lever railroad track scales consists of 25 standard models with capacities ranging from 60 to 200 tons per section, in various sizes and lengths, according to the Howe Scale Co., Rutland, Vt. The patented wedge adjustment, platciation.

GREATER OUTPUT LOWER UPKEEP WITH NEW TORQUE CONVERTER DRIVE

New standards of tractor-shovel performance are being set by the famous 1½ yd. Model HM "PAYLOADER" because a NEW Torque Converter drive has been added to its many features. A year of extensive field-testing proves that this new development insures faster, lower-cost materials handling because output is increased up to 1/3 and maintenance is drastically reduced.

Combined with the 4-speed, full-reversing transmission, the Torque Converter provides an unlimited range of automatically selected speeds to meet the load and operating conditions. Parts breakage and maintenance are less because shock loads are absorbed.

TORQUE CONVERTER DRIVE

MORE EFFICIENCY — Engine operates at most efficient speeds — no laboring or stalling

LOWER MAINTENANCE — Oil cushion absorbs load shocks—protects vital parts

EASIER OPERATION — Eliminates much gear-shifting and "clutching"

GREATER OUTPUT — Machine operates at highest speed in relation to load

Prove to yourself that this pioneer four-wheel-drive tractor-shovel, with torque converter, is the finest tractor-shovel available. Ask your "PAYLOADER" Distributor for a demonstration, or write The Frank G. Hough Co., 735 Sunnyside Ave., Libertyville, Illinois.

Write for full details on the big 1½ yd. Model HM, or on any of the six smaller "PAYLOADERS" — 1⅛ yd., 1 yd., ¾ yd., ½ yd. or 12 cu. ft. sizes.

YOU CAN'T COMPETE IF YOUR EQUIPMENT IS OBSOLETE

SAY "HUFF"

PAYLOADER®

THE FRANK G. HOUGH CO. • Since 1920

CUT DOWN ON *cable* LOSS

If you have cable wear problems, Ruberoid Insulating Tape is the right solution. Ruberoid Insulating Tape strengthens your cable with a vise-like power, so that you can drag it anywhere with complete safety . . . even acid pools or jagged surfaces will be no hazard. Its virtual immunity to abrasion is one of the reasons that it has been the preferred tape for protecting mining machine cables in coal mines for over 60 years. You can be assured of a longer, more economical life for your cable with these seven cost-cutting features:

- Double grip...both sides adhesive
- Great tensile strength . . . tough
- Won't tear, ravel or pucker
- Resists abrasion
- Acid- and alkali-proof
- Extra thick . . . one layer insulates
- Exceeds A.S.T.M. specifications by 40% in adhesiveness, 25% in tensile strength, 110% in dielectric strength.

For further information, write The Ruberoid Co., 500 Fifth Avenue, New York 36, N. Y.

The RUBEROID Co.

ASPHALT AND ASBESTOS BUILDING MATERIALS

form double-bearing yoke, interchangeable alloy-steel knife edges and bearings, and proper clearances for all suspension elements are among the features cited by the maker to insure freedom of motion, unusual sensitivity and sustained accuracy. Various types of weight indicators are available. Bulletin 685 gives full details.

Equipment Shorts You'll Want to Check

(35) PLASTIC PIPE in sizes from ½ in through 2 in now is available in pressure ratings of 75, 100 and 125 psi in the new "PressuRated" pipe recently announced by Yardley Plastics Co., Columbus, Ohio. The new pipe is packaged in 100-ft lengths in cardboard dispensing cartons which are clearly marked as to size and pressure rating, thus facilitating stocking and handling, the maker says. Packaged sizes are ½-, ¾-, 1- and 1¼-in pipes with a pressure rating of 75 psi.

(36) SKID-PROOF FLOOR COATING, developed by Pennsylvania Salt Mfg. Co., Philadelphia 7, Pa., is offered for application in plants or shops where oil, grease or chemicals create safety hazards or maintenance problems. The new coating, "NeoFloor," is a corrosion-resistant matrix of resilient neoprene with a grit filler which is bonded to the floor with an adhesive primer. Both primer and coating are liquid for easier application with brush or roller; it may be cleaned with commercial detergents, and will resist the action of corroding agents at temperatures up to 220 deg F, according to the manufacturer.

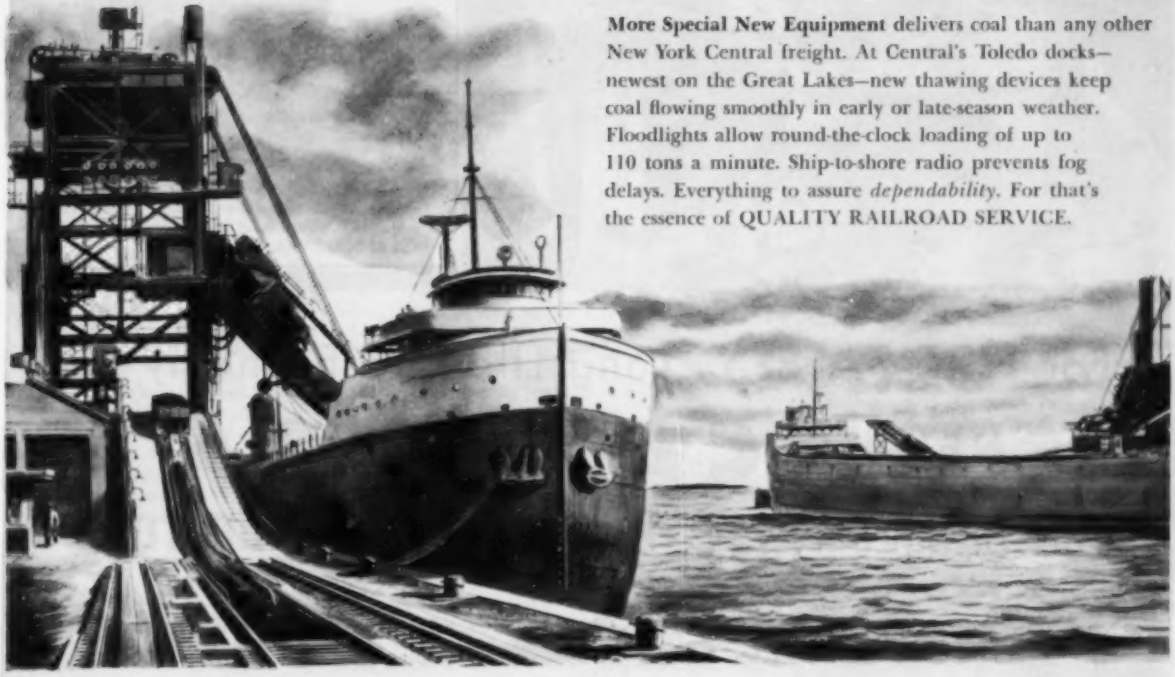
(37) CABLE CUTTER—A shear-type tool for cutting soft copper and aluminum cables, insulated or not, in sizes up to 1⅜ in, O. D., has the true shear action of two sharp, curved jaws so that the ends of the cable at the cut will not be crushed. Details from H. K. Porter, Inc., Somerville, Mass.

(38) STRIPED TAPE—"Hazardstripe," a new self-adhesive tape made for temporary or permanent marking of hazardous areas, may be quickly applied with finger-tip pressure and removed without scraping or scrubbing. The 2-in-wide, yellow and black tape is available with cloth backing for indoor use, vinyl backing for outdoor use and reflective backing. Details form Western Lithograph Co., Westline Products Div., Los Angeles 54, Calif.

(39) PLASTIC BARRIER ROPE, made of two yellow and one black strands for high visibility, may be used for making up barricades around electrical equipment, maintenance-work areas and so on. Known as "IPCO Polyrope," the new product is 5/16 in in diameter and is light and flexible. The rope has excellent dielectric properties, will not sag or stretch, will not support combustion, is not affected by oil and will not absorb dirt, according to the manufacturer, Industrial Products Co., Philadelphia 33, Pa.

Quality Railroad Service

means SPECIAL DELIVERY FOR COAL



More Special New Equipment delivers coal than any other New York Central freight. At Central's Toledo docks—newest on the Great Lakes—new thawing devices keep coal flowing smoothly in early or late-season weather. Floodlights allow round-the-clock loading of up to 110 tons a minute. Ship-to-shore radio prevents fog delays. Everything to assure *dependability*. For that's the essence of QUALITY RAILROAD SERVICE.

28,000 New Heavy-Duty Coal Cars have joined New York Central's great fleet in the last few years. They give coal shippers *extra* assurance of prompt pick-up from mines in the rich coal fields of Illinois, Indiana, Kentucky, Maryland, Ohio, Pennsylvania, Virginia and West Virginia.

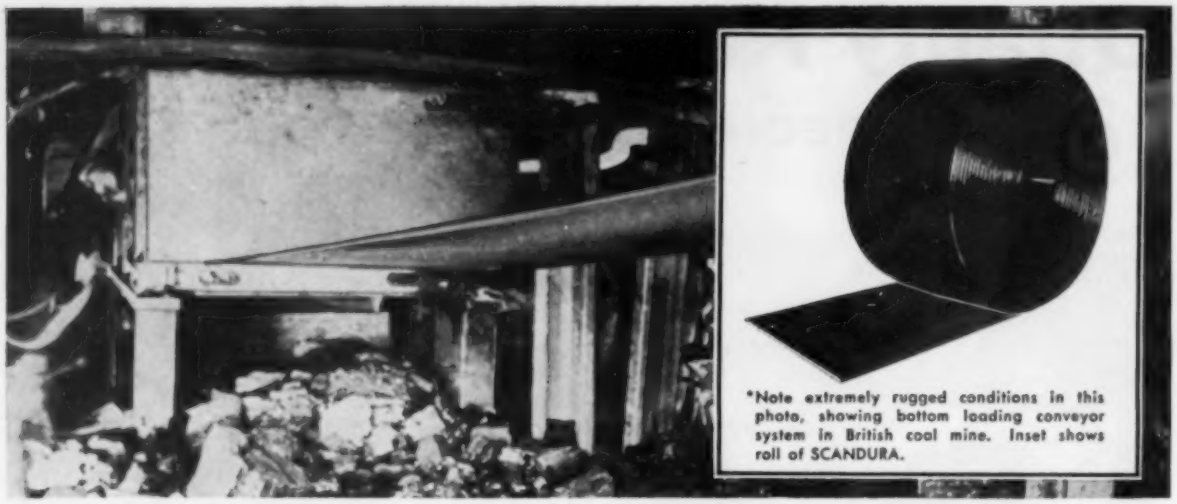
New Markets for Coal in Central's territory include an expanding chemical industry . . . plus billions in new steam power plants being built by private electric companies. And that's besides the majority of America's steel mills, factories and coal-heated homes . . . all located in the Central area.

He Knows What's New in Coal! Your New York Central Coal Traffic Representative can save you time and money on coal shipments . . . aid in developing new coal properties . . . or locate special types of coal you may need. His help, too, is part of QUALITY RAILROAD SERVICE.

New York Central

N.Y.C. Means Q.R.S.

NEW YORK CENTRAL SYSTEM Quality RAILROAD SERVICE



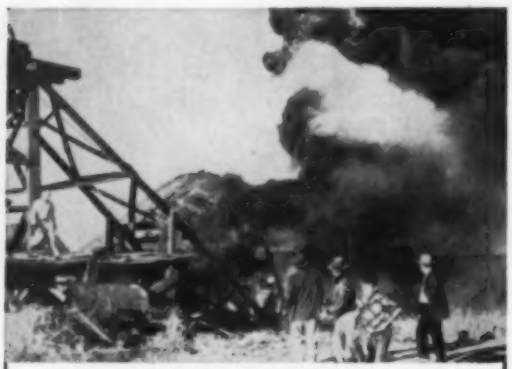
*Note extremely rugged conditions in this photo, showing bottom loading conveyor system in British coal mine. Inset shows roll of SCANDURA.

For **FIRE SAFETY,** Long Life and Economy —

NEW **SCANDURA**

The original P. V. C. coated conveyor **BELTING**

You want *extraordinary resistance* to wear and tear with top tonnage hauls—and you get it with SCANDURA. But even more, you want *fireproof conveyor belting* that eliminates one of the great hazards of mining—fire caused by friction when your conveyor belt slips or stalls.



LET'S LOOK AT THE RECORD!

About 12% of coal mining fires in the past several years have been attributed to conveyor-belt friction.

At the 1933 annual meeting of the Illinois Mining Institute, data was presented to show that the majority of belt fires result from stalled belts while the driving pulley continues pulling.

In the tragic Evanston, Ky. fire in which 4 men lost their lives, fire was reported to have had its origin in the friction caused when a fall stopped the belt, while the drive motor continued to operate.

This record clearly points to the great need for SCANDURA BELTING!

SCANDURA, developed by our parent company, and now being manufactured in our Charlotte, N. C. plant, has these unique features:

- *Withstands abrasions that would ruin other belts.*
- *Exceptionally tenacious in holding fasteners.*
- *Solid woven base with covers that will not strip, gouge or "dog ear".*
- *Not affected by water, dilute acids, alkalis, salt solutions, etc.*
- *Non-inflammable, mildew and rot-proof.*
- *Works in temperatures ranging from 22° below to 212° above.*
- *Can be made in widths from 1" to 42" and thicknesses from ⅛" to ⅜".*

SCANDURA has been tested and used with gratifying results in Britain since 1946. For safety and economy, it's in a class by itself. Write, wire or telephone for complete data.

SCANDINAVIA BELTING COMPANY
250 CENTRAL AVENUE, NEWARK 1, N. J.
BOSTON • PLANT: CHARLOTTE 1, N. C. • CLEVELAND

News Round-Up

Duquesne Light to Build First Atomic Power Plant

THE FIRST FULL-SIZED PLANT in the country to produce electricity from atomic energy will be built in Pittsburgh and operated by the Duquesne Light Co., the Atomic Energy Commission announced March 13. The $30-million plant, which will represent the first attempt to make commercial power from the atom, is being planned to produce 60,000 kw, which will go into Duquesne Light's system and be marketed to its regular residential and industrial customers along with electricity generated by conventional methods.

Although consumers will pay no more for the atom-produced power, "it is not expected that this first plant will produce power electric at costs competitive with power from conventional fuels," the AEC said. Subsidizing of the project by the government is worthwhile because the plant is regarded as a vital research project that will help cut costs in future plants.

Duquesne Light won the right to build the plant, which had been sought by many communities, because its proposal was the most favorable to the government among the nine bids submitted. Construction will begin as soon as the formal contract is completed. Under the arrangement, Duquesne Light will furnish a plant site on land it now owns in the Greater Pittsburgh area and will build at its own expense a new generating plant to take the heat produced in the nuclear furnace, turn it into steam and run the steam through turbines to produce power. The actual atomic part of the facility, the nuclear reactor which will serve as the furnace, will be designed and built by the Westinghouse Electric Corp., which has built several nuclear reactors for the AEC, including one for the atomic submarine.

According to the agreement, Duquesne Light will pay $5 million of the cost of the nuclear reactor and the AEC will pay the rest, about $25 million or more. The power company will operate both the reactor and the generating portions of the plant and will pay all costs of operating labor. Duquesne Light also will pay the government for the steam used in its turbines, beginning at 48.3c per million Btu of steam in the first year and increasing annually until it reaches 60.3c per million Btu in the fifth year. Atomic fuel for the reactor, enriched uranium, will be supplied by the AEC.

Some estimates place the cost of the entire plant at $45 million, including a figure of $36 million for the nuclear reactor and $9 million for the generating and turbine equipment Duquesne Light will supply. The government is expected to save about $30 million by making the utility a partner in the project, according to Rear Adm. Lewis L. Strauss, AEC chairman.

Also in This Section

News Briefs and Trends .....p 138
Personal Notes .....p 140
Obituaries .....p 140
AIME New York Meet .....p 144
Among the Manufacturers .....p 149
New Preparation Facilities .....p 152
Association Activities .....p 158
New Books for Coal Men .....p 159

American-Built Plant Spurs Turkish Lignite

INCREASED DEMAND for a high-type fuel, sparked by the industrialization of Turkey, has resulted in erection of this American-type ultra-modern coal-preparation plant at Soma, Turkey, where a lignite deposit has been under development for 80 yr. The demand for coking coal has added impetus to building of a plant that would supply coals for industry, as well as metallurgical coal. The new washery, which recently began operation under the management of the Eti Bank of Ankara, was designed, equipped and erected by the McNally Pittsburg Mfg. Corp., with the equipment used manufactured in its shops in Pittsburg, Kan. The fully automatic washing equipment consists of coarse- and fine-coal washers of the McNally-Norton Baumjig type and the coal is dried in two McNally-Carpenter centrifugal driers to a surface moisture not exceeding 4%. The new washery has a capacity of 165 short tons of coal an hour and incorporates the latest American developments and equipment in coal-preparation technique.

Coal-to-Oil Plant to Open in South Africa

A $100-million plant now being built in the Union of South Africa to commercially process a low-cost shale-type coal directly into gasoline and other petroleum products is scheduled to begin preliminary operations early this summer, with full operation slated by the end of the year. Financed by the government, the plant is being built for the South African Coal, Oil & Gas Corp. (Sasol) on top of a vast coal field, at Coalbrook, in the Orange Free State Province, 50 mi south of Johannesburg. Construction is supervised by the M. W. Kellog Co., of New York.

If the plant proves successful, it will be possible to process 1 ton coal costing about 6 shillings, or 84c, into fuel and chemical products worth about $9.10, Sasol estimates. It is expected to produce products worth about $28 milllion annually.

According to estimates, the plant will produce about 55,000,000 gal of gasoline annually, or around one-fifth of South Africa's needs; 4,500,000 gal of diesel oil, and over 1,000,000 gal of fuel oil. By-products from the plant will include ammonia sulphate for fertilizer, ammonia, alcohols, phenols, coal-tar products, etc.

SECOND MINER ON ITS WAY . . .

. . . UNDERGROUND AT GLEN ALDEN

RESULTS from the first Joy Continuous Miner ever to be used in deep anthracite mining were so satisfactory that it began operating a second Joy Miner last month, the Glen Alden Coal Co. reports. Continuous-mining tests began last September at the company's Loomis colliery, where the first machine was placed in the Ross vein, No. 4 shaft, 1,400 ft underground ***(Coal Age*****, November, p 136; October, p 135). Shown starting their trip down the shaft are the cutting head (top photo) and center section of the second machine, which were assembled on the bottom with a tail section to form a complete machine placed in service to augment the output from the first unit.**

Westmoreland Coal Notes 100 Yr Of Continuous Bituminous Operation

ON JULY 7, 1954, the Westmoreland Coal Co., Philadelphia, will celebrate the 100th Anniversary of its founding, which, it believes, makes it the oldest bituminous coal mining company in the country that has maintained a continuous existence. It now operates mines in both Pennsylvania and West Virginia.

In the Year 1854, when Westmoreland Coal was chartered and opened its Larimer mine, the Pennsylvania R.R. completed its famous "Horseshoe Curve," which marked the beginning of through trains from Pittsburgh to Philadelphia. There were other historical events in that period. Franklin Pierce was President of the United States. Admiral Perry succeeded in opening the ports of Japan and made our first treaty with that country. California had just been admitted to the union as the 31st State. Coal was burned in fireplaces and stoves, but was secondary to the use of wood as a fuel for heating. Manufacture was in an elementary stage, and coal contributed little to power.

Gas made from coal was being used for lighting purposes and Westmoreland Coal Co.'s Criterion coal was nationally recognized as the preeminent gas coal of the country. Early in its history, the company operate a fleet of barges to permit delivery of Criterion gas coal to coastal areas. One of the earliest records of movement to a coastal area was the loading of the schooner "Zephyr," at Philadelphia, in December, 1869, for ultimate delivery to the Bridgeton Gas Light Co., Bridgeton, N.J. Incidentally, Westmoreland Coal started shipping to Bridgeton Gas Light in 1857 and continued shipments of Criterion coal to it for a period of 93 consecutive years, or until the manufacture of artificial gas from coal was discontinued in 1950.

During the 100 yr, 1854-1953, Westmoreland Coal Co. has produced a total of 166,530,683 tons, or an average of 1,665,307 tons a year. The peak production year was 1913, when it mined 4, 794,835 tons. The company still has large reserves and many more years to operate in the Irwin Gas Coal Basin in Westmoreland County, Pennsylvania. As production tends to decrease in this area, it will be more than offset by increased output by the new Hampton Mines, Boone and Logan counties, West Virginia, the company points out. The large reserve acreage in West Virginia will insure Westmoreland Coal of being the oldest continuously operating bituminous mining company for many many years to come, officials believe.

Some of the highlights in Westmoreland Coal Co.'s 100 yr history are:

1855—Purchased 24 railroad cars to ship coal to market.

1856—Purchased the Oak Grove mine, later called the North Side mine, from Thomas A. Scott and others. Mr. Scott later became president of the Pennsylvania R.R. Also purchased the Spring Hill mine, near Pitcairn, Pa. The company's capacity in this year was 112,000 tons.

1857—Supplied coal to 37 gas companies, as far east as Maine, south to Georgia, and to the interior of Massachusetts, by rail from New Haven.

1861—Because of the car shortage on the Pennsylvania resulting from the large number used for troops and supplies in the "War Between the States," purchased for its use 200 railroad cars with a capacity of 22,500 lb and costing $413.44 each.

1870—Absorbed the Foster Coal & Iron Co.

1871—Opened Biddle mine. Built Westmoreland Mansion House at Irwin, Pa., for use of officials and directors.

1872—Absorbed the Westmoreland-Youghiogheny Coal Co. Opened Adams mins.

1874—Absorbed the Philadelphia & Youghiogheny Coal Co.

1880—Absorbed the Shafton Coal Co.

1892—Opened Export No. 1 mine.

1904—Opened Riley mine (originally named Criterion).

1905—Opened Export No. 2 mine.

1908—Opened Magee mine.

1917—Opened McCullough mine.

1918—Absorbed the Penn Gas Coal Co. and the Manor Gas Coal Co.

1925—Opened Hutchinson mine.

1923-24-27-28—Purchased coal lands in West Virginia for current operations in that state.

1949—Opened Hampton mines.

Hanna to Spend $2,500,000 On New Strip Shovel

A new stripping shovel, larger than any now in operation, will be purchased for use by the Hanna Coal Co. Div., the annual report of the Pittsburgh Consolidation Coal Co. issued last month revealed. The shovel will cost $2,500,000 and will take 2 yr to build, the report said. A pioneer in big-shovel design and operation, Hanna Coal is understood to have had the project under consideration for some time. The new unit is expected to have a bucket of a least 60-cu yd capacity, or even up to 75 yd according to some reports, but details have not yet been released. (*Editor's Note: For a detailed report on Hanna Coal's shovel development over the past 10 yr,. see the article on pp 80-87, October, 1953, Coal Age.*)

"Sinclair Lubricants Cut DOWNTIME"

Coking coal used to process steel for the Lone Star Steel Company is mined at the company's own modern, mechanized mines in McAlester and McCurtain, Oklahoma.

Their coal mining machinery is protected in its rugged every day operation by 5 selected Sinclair Lubricants.

Mr. Campbell R. Cameron, General Superintendent of Coal Mines, says, "Sinclair Lubricants give thorough lubrication . . . with minimum wear . . . and maximum runs between overhauls. The result is . . . considerable savings in maintenance costs, *less downtime* and less replacements needed."

In addition, the simplified lubrication procedure set up by Sinclair Lubrication Engineers has enabled Lone Star to cut lubricant expenditures by minimizing waste.

Invite a Sinclair Lubrication Engineer to consult with your Maintenance Superintendent. Call your local Sinclair Representative or write to Sinclair Refining Company, 600 Fifth Avenue, New York 20, N. Y.

SINCLAIR LUBRICANTS

News Briefs and Trends

Meetings in 24 Cities Start In Foreign Oil Drive

A series of meetings to be held in 24 major cities from Kansas City to the East Coast under the sponsorship of the Foreign Oil Policy Committee got under way last month. Sessions held by management and labor representatives of coal, railroad and allied industries to work for legislative limitation of the import of cheap foreign oil included those in Detroit, Cleveland, Des Moines and Lexington, Ky. Attending the meetings were coal men from the respective regions, representatives of the FOPC, the NCA, the American Coal Sales Association, the UMWA and other groups, as well as representatives of manufacturing firms affected by foreign trade policies. R. L. Ireland, chairman of the executive committee, Pittsburgh Consolidation Coal Co., served as chairman of the Cleveland meeting March 17, and George S. Ward, secretary of the Harlan County Coal Operators' Association, presided at the Lexington session March 18.

State Governors to Confer On Coal Industry Problems

Gov. John S. Fine announced last month that he had asked the governors of 15 other coal-producing states to confer with him in Washington April 26, the opening day of the White House Governors' Conference, to discuss various problems of the coal industry. Emphasizing that "the welfare and security of the Nation depend upon the maintenance of a healthy domestic fuels industry," Gov. Fine said, "of primary importance is foreign oil. I raise the question whether it is not time that the governors of our principal coal-producing states take an interest in the problems of the coal industry through some continued organized group action." More favorable federal tax policies, transportation costs, underground gas storage, encouragement of coal use in public buildings and stimulation of basic research, are among the other subjects on the proposed agenda.

Two Mines Re-Opened Without UMWA Contract

Two closed mining properties, formerly operated with UMWA members, are being re-opened without a UMWA contract, recent reports indicate. At Stearns, Ky., it was reported March 18, the Stearns Coal & Lumber Co. has resumed operation of its Mine No. 16 with 50 men who are members of the newly organized McCreary County Miners' Union, with which the company has signed a 2-yr contract. The mine was the only one of its properties operating when the company closed down several months ago, but the firm hopes to re-open other mines as soon as market conditions permit, officials said. The company maintained last fall that it could not operate profitably with the current UMWA wage scale.

In Virginia late in February, the Splash Dam Coal Corp. announced that it would soon re-open its Dickenson County mine, closed since November, and eventually expected to employ 175 to 200 men when in full prduction. Over 200 applications for work had been received in the previous 3 wk and more were coming in every day, it said.

New Group Formed to Stockpile Anthracite

Formation of the Anthracite Distributors Corp. by a group of smaller independent anthracite producers and sales firms for the warehousing and financing of stockpiles to even out production schedules was reported last month. Headed by Paul V. Forte, Cargo Coal Sales Co., the new organization will seek to absorb the surplus production of the qualifying mines and breakers, ship it to terminal points and sell it during the normal heating season, thus helping to maintain level production throughout the year.

Virginia Legislature Okays Study of State's Coal Use

A study of the use of coal by state agencies and institutions, already approved by the Virginia Senate, was passed by the House Appropriations Committee March 11. The resolution is designed to obtain information on the relative costs of coal and oil as fuels for state agencies. According to Sen. M. M. Long, of Wise County, who sponsored the proposal, many state institutions are not now using coal and the study would help show how the state could save money by its use, as well as providing more business for mines in the state.

Pocahontas Fuel Outlay Adds Up to $32,000,000

By August, the Pocahontas Fuel Co., Inc., will have spent $32,000,000 on capital improvements for new and greatly improved mining facilities since 1949, A. R. Matthews, president, announced March 17 in releasing the company's annual report for 1953. With the Bishop mine, scheduled for completion this summer, the company will have completed three newly mechanized mines with modern cleaning plants in the last several years, each with a productive capacity of over 10,000 tpd, he reported.

UMWA Drive Starts in Ohio

A picket line established March 4 in near-zero weather and a swirling snow storm at a mine of the Humphrey Coal Co., near Lafferty, Ohio, was the first move in a concentrated drive to unionize the many non-union strip mines in Ohio, UMWA officials were reported to have stated. Similar drives have been going on with varying intensity for many months in Central Pennsylvania and parts of Virginia and Kentucky. In the first legal action reportedly resulting from the Ohio campaign, Joe Dudek, operator of the Dudek Coal Co., filed suit March 12 in the Belmont County court asking that some 30 union pickets be restrained from interfering with the mine's operation and employees, and with the B. & O. trainmen serving the property.

BCR to Research Stack Dust

Bituminous Coal Research, Inc., announced March 9 start of a research project to develop engineering data on spray-type stack-dust collectors. Urged by the Coal Producers' Committee for Smoke Abatement and several members of the Air Pollution Control Association, the project has three objectives: (1) to reduce stack emission during soot blowing at commercial and industrial boiler plants; (2) to minimize corrosion and other stack deterioration caused by water sprays; and (3) to publish engineering data to help boiler plants operate within city stack-emission requirements.

And For Your Information . . .

A new concrete-lined ventilating shaft will be constructed at Mine No. 5 of the Jones & Laughlin Steel Corp., Marianna, Pa., by the Shaft & Tunnel Dept. of the Dravo Corp., Pittsburgh. To be sunk vertically 574 ft through rock, the shaft will be elliptical in shape and measure 41 ft 9 in by 19 ft inside the concrete lining. A curtain wall will separate the elevator compartment from the airway, which will also contain a steel stairway.

Vacuuming anthracite ashes out of basement in Brattleboro, Vt., is one of the scenes in the latest "Industry on Parade" TV program of the National Association of Manufacturers released to some 300 TV stations last month. The film, originated by the Anthracite Information Bureau, shows the retailer's anthracite vending machines as well as the operation of its special ash-removal truck.

A proxy battle for management control of the Lehigh Valley Coal Co. was reported last month in advance of the company's annual meeting scheduled for April 6. Active in the group seeking to replace present directors and management is Arch J. Alexander, former chief of the West Virginia Department of Mines.

Two men were killed and three injured, according to reports, when a box of dynamite exploded March 22 at the Morgan Bryant strip mine of Morgan Mines, Inc., near Canton, Ill.

Its 30th anniversary of specialization in serving the bulk coal requirements of steel mills, utilities, railroads and ship lines in the northeastern United States is being celebrated this year by the Clyde E. Speer Coal Corp., Pittsburgh. Mr. Speer, founder and president of the firm, comes from a family active in the industry since the early 1800's when his great-grandfather ac-

Continued on p 156

Farbizo Coal Co., Dover, Ohio

2 Years Old!...16,280 Hours!...No Repairs! ...Oil Consumption Unchanged! With Cities Service DC-330 Oil

ONE OF FARBIZO'S GRADALLS has done an outstanding job on a 38 core slag pit. Cities Service DC-300 oil keeps Farbizo's hard-working Gradall shovel in top shape.

IN THEIR TD 24 BULLDOZER TOO, Farbizo relies on heavy duty, high detergent Cities Service DC-300 oil. Heat-resistant, long-lasting and free-flowing DC-300 does the finest job possible.

Twin G.M.C. Diesels in Marion Shovel Give Outstanding Performance!

Here's the story from the Farbizo Coal Co.:

"Following are the pertinent facts with reference to the Marion 111 M Shovel using DC-330 Oil since January, 1951:

"Developed ample power with TWIN G.M.C. Diesels operating at 1550 R.P.M. Operated 16,280 hours with no motor breakage or repairs. Mined 203,000 tons of #5 coal from 36" seam with an average over burden of 35 feet hard pan shale with streaks of iron ore bands.

"Oil consumption 1 pint per week, oil and filters changed weekly. Consumption is same as when shovel was new. Motors were recently inspected but no repairs or replacements needed. Unusual performance praised by G.M.C. and Marion Shovel representatives.

"Similar results using DC-300 Oil in two Gradall shovels and International TD 24 Bulldozer."

Let Cities Service lubricants protect the important investment you have in your machinery. Call your nearest Cities Service representative or write Cities Service Oil Co., Sixty Wall Tower, New York 5, New York.

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Personal Notes

James Cannon, assistant mine foreman, Mine 214, Consolidation Coal Co. (Ky.), Div. of Pittsburgh Consolidation Coal Co., Jenkins, Ky., has been promoted to mine foreman. Joining Consol in 1937, Mr. Cannon was appointed section foreman in 1950, and assistant mine foreman in 1953.

William G. Gerow, engineering assistant to the president for the past 2 yr, has been named chief engineer, West Virginia Coal & Coke Corp., Cincinnati. He also was elected vice president, Paradise Collieries, Inc., an affiliate.

Ronald B. Talbert, assistant mining engineer, Elk River Coal & Lumber Co., Widen, W. Va., has been named mining engineer at the company's Widen mine.

Charles E. Walker, general conveyor foreman, has been advanced to superintendent, Tioga No. 1 mine, Tioga Coal Corp., Tioga, W. Va. A veteran of 22 yr in southern West Virginia mines, Mr. Walker was associated with the New River Co. and the Elk River Coal & Lumber Co., prior to joining Tioga in July, 1953.

Nearing the Ripe Age of 70

THIS WELL-PRESERVED BOUND VOLUME of the *Colliery Engineer*, dated 1887 and 1888, is a treasured possession of officials at Springdale mine, Allegheny Pittsburgh Coal Co., Logan's Ferry, Pa. In the photo, Rudy Benn, hoisting engineer, looks over some of the old advertisements and finds that some of these firms still are doing business in the coal industry. *Colliery Engineer*, published at Scranton, Pa., may be considered the daddy of *Coal Age*. In October, 1915, the Hill Publishing Co., then publishers of the youthful *Coal Age*, purchased the *Colliery Engineer*. The first issue of the combined publication appeared the following month, Nov. 6, 1915.

Peyton L. Mitchell, formerly general manager of the Knott Coal Corp., Anco, Ky., has been elected president of the company, succeeding **Hugh Buford,** who is now chairman of the board.

I. A. McAdoo has been named assistant general superintendent of the Sterling Smokeless Coal Co., Whitby, W. Va., and its affiliate, Mount Hope Coal Co., Holcomb. Mr. McAdoo, who has been with the companies for about 10 yr as chief engineer, also will continue in that post.

Alex Reed, general mine foreman, Melcroft (Pa.) mine, Coal Div., Eastern Gas & Fuel Associates, retired Feb. 15, with a record of 53 yr of service in coal mines without a lost-time accident. Mr. Reed, who has been succeeded as general mine foreman by **D. J. Stuart,** was honored on his retirement at a dinner attended by mine and company officials. Starting in the mines as a trapper boy at the age of 10, Mr. Reed was associated with various companies during his long career, serving as mine superintendent for Rochester & Pittsburgh and others before joining EG&FA in 1939.

Charles A. Barrett, formerly general mine foreman at the Helen mine of the Coal Div., Eastern Gas & Fuel Associates, has been transferred to the company's Keystone (W. Va.) mine as general mine foreman over a portion of the property, sharing the duties of general foreman with **W. L. Laxter,** former general mine foreman at Carswell, who was transferred to Keystone on closing of Carswell mine. Other foremen transferred to the Keystone mine from closed properties include: **L. C. Snyder, Mack Waselchalk** and **Virgil Elkins,** formerly at Helen mine; and **William Bailey,** of Eccles. **Guy D. Wilson,** previously resident engineer at Maitland, has been transferred to Keystone and appointed plant safety inspector. **William Odham** has been promoted to section foreman at Keystone.

T. Leo Healey, superintendent of Coal Brook, Powderly and Gravity Slope operations of The Hudson Coal Co., Scranton, Pa., since 1943, has retired after 50 yr of service to the company. Mr. Healey, who joined the company in 1904 as doorboy, worked his way up through various positions, becoming superintendent of Baltimore Colliery in 1941.

Frank G. Phillips, mine foreman, Loomis colliery, Glen Alden Coal Co., Wilkes-Barre, Pa., has been named supertendent, succeeding **Daniel Thomas,** who was transferred to Woodward colliery as superintendent. Mr. Thomas succeeds **John Mould** who retired. Joining Glen Alden at early age, Mr. Phillips worked at various operations, and in 1929 was made fireboss at Loomis, later becoming section mine foreman and mine foreman.

Ed Seese, assistant foreman, Crescent mine, Pittsburgh Coal Co., Div. of Pittsburgh Consolidation Coal Co., Daisytown, Pa., has been promoted to superintendent at Crescent mine. Starting at Crescent in 1935, he became assistant foreman in 1940, and assumed the duties of superintendent upon the death of William Wilkie.

Dr. Morris M. Leighton, chief of the Illinois State Geological Survey for the past 31 yr, will retire July 1. He will be succeeded by **Dr. John C. Frye,** for the last 9 yr state geologist of Kansas and chief of the Kansas State Geological Survey. Dr. Leighton, who expects to devote his time after retirement to his studies of the glacial geology of Illinois, has long been active in work on Illinois coals, particularly in seeking new uses for the coals produced in the state.

J. D. Francis Retires From Island Creek Posts

JAMES D. FRANCIS, a veteran of over 40 yr of service with the Island Creek Coal Co., Huntington, W. Va., and associated with its affiliate, Pond Creek Pocahontas Co. since its formation in 1923, has severed his official connection with the firms. Mr. Francis, who last month announced his retirement from the firms' executive committees, joined Island Creek in 1911 as counsel and served as vice president, president and chairman before his retirement from the board in June, 1952. He continues as president of the Powellton Coal Co., and chairman of the boards of its affiliates, Princess Elkhorn Coal Co., and Princess Coal Sales Co.

Obituaries

William E. Weineck, 69, general manager, Phoenix Park Coal Co., Pottsville, Pa., died March 13 at his home in Nanticoke, Pa. Widely known in the area, Mr. Weineck was associated with the Susquehanna Collieries Div. of the M. A. Hanna Co. for 53 yr and was superin-

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from ¾ cu. yd. to 45 cu. yds.

tendent of its Glen Lyon colliery from 1932 until he retired in 1949. He joined the company as a breaker boy at the age of 12 and later served as master mechanic and superintendent of construction and maintenance, as well as mine superintendent.

Charles P. Gillespie, 50, president of the Tazewell Coal & Iron Co., Big Sandy Coal & Coke Co. and Coal Mountain Mining Co., died March 10 at his home in Tazewell, Va., following a long illness. A graduate of the University of Virginia Law School, Mr. Gillespie was active in a number of business firms in the region and at the time of his death was a director or official of the Yukon Pocahontas Coal Co., the Buchanan Coal Co., Consumers Mining Corp., Tazewell, the Flat Top National Bank of Beckley and the Tazewell National Bank.

Arthur Waldman, 45, general superintendent, Frick District, United States Steel Co., Uniontown, Pa., died March 10 following a heart attack in Hollywood, Fla., while on vacation. A mining engineering graduate of Lehigh University, Mr. Waldman was with the TC&I Div. of U. S. Steel before joining the Frick District as assistant general superintendent in 1947. Previously he had served as general superintendent of coal mines for the American Smelting & Refining Co., in Mexico. He had been general superintendent of the Frick District since 1951.

Lee Llewellyn, active in the design and construction of coal preparation plants for over 50 yr, died March 7 in the West Penn Hospital, Pittsburgh, after a brief illness. One of the pioneer tipple and cleaning plant engineers, Mr. Llewellyn started his career as a design engineer with Heyl & Patterson, Inc., in 1901. He was chief engineer and later vice president of the Pittsburgh Coal Washer Co. from 1911 to 1936, when he joined the sales department of Koppers Rheolaveur. He was associated with Roberts & Schaefer Co. in its Pittsburgh office when he retired from active business in 1951. Mr. Llewellyn, who held patents for coal-washing machinery and pig-casting machinery for blast furnaces, also was general sales manager for the Houston Coal Co., Cincinnati, from 1924 to 1927.

John Chromey, mine foreman, Kehoe-Berge Coal Co. and Warnes Coal Co., Moosic, Pa., died at his home in Duryea, Pa., after an extended illness. Active in civic and political life of the community, he served as councilman for one term in Duryea Borough.

Lorain-Lorado Magazine Cited by Freedoms Group

THE LORAIN-LORADO JOURNAL, employee publication of the Lorain Coal & Dock Co., and the Lorado Coal Mining Co., and its editor, Harry C. Walter (above) have again received Honor Medal Awards from Freedoms Foundation at Valley Forge, Pa., for outstanding contribution to a better understanding of our American Way of Life during 1953.

This marks the fifth Freedoms Foundation Award received by the Lorain-Lorado companies in the last 4 yr. Stanley B. Johnson, president, won a Fourth Place Award in 1950 and a Second Place Award in 1952 for his editorials appearing under his "President's Corner" in the *Lorain-Lorado Journal,* which also won a Second Place Award in 1950 and a Certificate of Merit Award in 1952 in the employee-publication category.

Since 1949, when Freedoms Foundation was chartered, only five company employee publications in the nation, including all types of industries, have received five awards and Lorain-Lorado are the only coal mining companies ever to receive an award from this organization. The 1953 award winners were chosen by a distinguished jury composed of 30 state supreme court jurists and executive officers of national patriotic and military organizations and service clubs from more than 100,000 nominations submitted by the general public.

1953 Coal-Company Earnings

Earnings reported below are for the year ended Dec. 31, 1953, compared with the same period of 1952:

Pittsburgh Consolidation Coal Co.—1953 net income of $14,439,435, or $6.71 a common share, on gross revenue of $188,534,791; compared with 1952 net of $14,866,395, or $6.86 a share, on revenue of $186,951,975 (exclusive of profits on disposal of properties and investments, $1,543,020 in 1953 and $720,081 in 1952).

Pocahontas Fuel Co., Inc.—1953 net of $1,797,665, or $1.90 a share, on sales of $64,124,111; against 1952 net of $1,693,427, or $1.79 a share, on sales of $63,956,554.

West Kentucky Coal Co.—1953 net of $1,788,133, or $2.09 per common share; compared with 1952 net of $2,504,129, or $2.92 a share.

West Virginia Coal & Coke Co.—1953 net of $554,581, or $1.11 a share; compared with 1952 net of $682,472, or $1.36 a share.

MEETINGS

Indiana Coal Mining Institute, Spring Meeting, Hotel Deming, Terre Haute, Ind., April 10.

Ohio Coal Association: Annual Meeting, April 19, Cleveland, Ohio.

AMC, Coal Div.: 1954 Coal Convention, May 3-5, Netherland Plaza Hotel, Cincinnati.

Air Pollution Control Association: 47th Annual Meeting, May 3-6, Patten Hotel, Chattanooga, Tenn.

International Conference on Complete Gasification of Coal: May 3-8, Liege, Belgium. Information from: Inichar, 7 Boulevard Frere Orban, Liege, Belgium.

Pennsylvania Society of Professional Engineers: Annual State Convention, May 7-8, Bedford Springs Hotel, Bedford, Pa. Information from: L. F. Tierney, 301 Pine St., Hollidaysburg, Pa.

Southern Appalachian Coal Operators' Association: Semiannual Meeting, May 21, Knoxville, Tenn.

Southern Appalachian Industrial Exhibit, May 26-28, Bluefield, W. Va.

Central Pennsylvania Coal Producers' Association: Meeting, May 27, Penn-Alto Hotel, Altoona, Pa.

Big Sandy-Elkhorn Coal Operators' Association: Annual Meeting, June 4, Lexington, Ky.

American Retail Coal Association: Annual Meeting, June 15-16, Sheraton-Gibson Hotel, Cincinnati, Ohio.

American Coal Sales Association: Annual Meeting, June 23-27, Hotel Broadmoor, Colorado Springs, Colo.

Mine Inspector's Institute of America: 44th Annual Convention, June 28-30, William Penn Hotel, Pittsburgh, Pa.

Rocky Mountain Coal Mining Institute: Annual Meeting, June 28-30, Denver, Colo.

Coal Production to Date

1954 output of bituminous coal, through March 13, 1954, totaled 76,313,000 tons, a decrease of 15.9% from the 90,771,000 tons mined in the same period of 1953, according to USBM figures. Production in the week ending March 13, 1954, was 6,940,000 tons, an increase of 685,000 tons, or 11% over the preceding week.

Anthracite production through March 13, 1954, was 5,880,000 tons, down 5.7% from the 6,236,000 tons produced during the 1953 period. For the week ending March 13, 1954, output was 488,000 tons, up 82,000 tons (20.2%) over the previous week.

Whatever your fuel needs, we have a coal that is

Just the Ticket!

• In fact, you can write *your own* ticket—for the vast Bituminous fields served by the Baltimore & Ohio contain excellent coals *in wide variety*. For centuries to come, these coals will be available—a dependable source of low-cost heat and energy.

Modern mechanization at the mines assures low costs as well as uniform size and quality. The location of the fields—close to industry's front door—contributes to low transportation expense. Storage is economical because costly facilities are not required. And with the help of new combustion methods and equipment, Bituminous offers its users an increased burning potential.

ASK OUR MAN! He can give you worthwhile advice as to supply sources and burning methods for the particular coal you need. The efficiency, economy, and cleanliness of B&O Bituminous today will be a revelation!

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AIME—The New York Meeting

1. Longwalling
2. Continuous Mining
3. Remote Mining
4. Strip Operations
5. Electrocarbonization
6. Gob-Pile Fire Control
7. Training in Coal Sales
8. Non-Fuel Uses for Coal
9. Coarse- and Fine-Coal Cleaning

MECHANIZED LONGWALL MINING in Nova Scotia, better preparation, new anthracite mining methods, continuous-mining problems and opportunities, control of gob-pile fires, non-fuel uses for coal, sales training, long-distance conveying, electrocarbonization and distribution of reserves were major topics for discussion at sessions of the Coal Division at the annual meeting of the AIME, New York, February 15-18. The Canadian Institute of Mining and Metallurgy joined with the Coal Division for the first time in sponsoring the Monday and Tuesday sessions.

Speakers at the lead-off session on Monday morning were Frank Doxey, assistant general manager, Dominion Coal Co., Ltd., Sydney, N. S., on longwall mechanization in Nova Scotia mines; and D. H. Dowlin, chief engineer, Buckeye Coal Co., Nemacolin, Pa., on operating experience with a dense-media cleaning system on No. 2 Gas-seam coal in West Virginia. J. B. Morrow, consulting engineer, Pittsburgh, Pa., and W. E. Uren, Dominion Coal Board, Ottawa, presided.

In discussing the use of Dosco contiruous-mining machines, now proving themselves of great value in increasing the efficiency of longwalling in Nova Scotia mines, Mr. Doxey pointed out that natural conditions, including cover up to 4,000 ft thick, make longwalling in general the preferred method of recovery, with retreat operations specifically preferred over advancing methods to eliminate roof-control and roadway-maintenance problems. Operating on 500-ft-long faces in seams pitching 17 deg and more, face crews on mechanized longwalls achieve an output which averages about 10 tons per man-shift. Under similar conditions, productivity in sections where coal from long faces is hand-loaded into conveyors averages less than 3 tons per man-shift. Recovery is about 95% of the available coal.

On the subject of haulage, Mr. Doxey declared that a change from main-and-tail-rope methods to diesel locomotives in some sections resulted in a remarkable improvement in safety. For example, production per lost-time injury is about four times as great in diesel-equipped sections as in the endless-rope sections.

COARSE-COAL PREPARATION

In the first of four papers on coarse-coal cleaning, Mr. Dowlin presented results of experience with a Neldco dense-medium plant which is cleaning 4x¼-in Eagle-seam coal containing from 15 to 30% near-gravity material in the raw feed. Even with this difficult feed, misplaced material is only about 0.7% of the total feed. Sink in the clean coal averages about 0.5% and float in refuse about 1.5% with the vessel operating at 1.45 sp gr.

Changes in flow circuits, which resulted in better plant performance, included relocation of the tramp-iron magnet from its original position above the raw-coal feed chute ahead of the picking operation to a new position at the discharge end of the conveyor which feeds the dense-medium vessel. Previously, some tramp iron had escaped the magnet and caused damage in the separating vessel. Also, the slotted cloth on the clean-coal dewatering screen was rotated 90 deg to place the length of the slots at right angles to the flow of the coal. This change solved a serious problem in eliminating breakage in the back-up bars of the screen, thus materially increasing screen life. Co-authors with Mr. Dowlin were Edward Jolly, preparation engineer, Youngstown Mines Corp., Dehue, W. Va., where the plant is located; and D. R. Mitchell, head, Department of Mineral Technology, Penn State University, State College, Pa., the plant designer.

At the Monday afternoon session, the preparation theme was continued by three other speakers: G. A. Vissac, consulting engineer, Vancouver, B. C., on the theory and practice of the modern feldspar jig; W. M. Bertholf, preparation engineer, Colorado Fuel & Iron Corp., Pueblo, Colo., on the use of jigs in washing metallurgical coal; and H. R. Stelzriede, preparation engineer, Chicago, Wilmington & Franklin Coal Co., Benton, Ill., on preparation at his company's Orient No. 3 mine, Waltonville, Ill. Co-chairmen were R. E. Zimmerman, vice president, Paul Weir Co., Chicago, and J. M. Vonfeld, production-control manager, Pittsburgh Coal Co., Library, Pa.

Offering the feldspar jig as a possibility for cleaning minus ⅜-in coal, Mr. Vissac described several French installations of such units. In one instance a feldspar jig is converting 70% of 14%-ash feed into 4%-ash clean coal. The installation also produces a middlings product, 21% of the raw feed, containing about 11% ash.

INDUSTRY MEETING—
A Special COAL AGE
Staff-Written Report

Awarded AIME Honors

L. C. CAMPBELL, vice president, Eastern Gas & Fuel Associates, and president of the National Coal Association, was awarded the Erskine Ramsay Gold Medal by AIME with this citation: "Outstanding in his 35 yr as engineer, operating official and executive in the coal-mining industry have been his contributions to mechanization, safety and the education and welfare of employees."

Recent studies indicate that ceramic products, especially designed for this application, may possibly replace feldspar as a bed-control agent.

Mr. Bertholf described recent changes in preparation methods at the CF&I coke plant, including the replacement of 27 older tables with two 7-ft 3-compartment 6-cell Jeffrey jigs and the replacement of six old driers with three CMI Model E centrifugal units. The 2x0 coal is washed, with 2x⅜ or 2x¼ dewatered by screening, the ⅜ or ¼x20 mesh dewatered in the centrifugal driers and the remaining fines settled out in cones. In presenting the picture of the operation, Mr. Bertholf pointed out that final cost of the coke at the blast furnace governs the degree of cleaning to be aimed at in the preparation plant, since the company has the option of removing impurities in the preparation equipment or in the blast-furnace slag. Settling upon the final ash content of the clean coal, therefore, is a matter of balancing the economics involved in handling the impurities at the cleaning plant and at the blast furnace. The changes in the plant, Mr. Bertholf noted, were made necessary by demands for greater throughput at the plant to satisfy a growing demand for coke. The changes resulted in a 32% increase in throughput. Mr. Bertholf's co-author was J. D. Price, superintendent of the CF&I by-product coke plant.

Final paper of the session was Mr. Stelzriede's description of the new Orient No. 3 plant, where 6x$\frac{7}{16}$-in coal from the Illinois No. 6 seam is washed in a 7-ft 2-compartment 5-cell Jeffrey jig and the $\frac{7}{16}$x48 mesh is air-cleaned on five Roberts & Schaefer Super Airflow tables. The jig handles about 550 tph and the tables about 500 tph, all produced by continuous-mining machines.

Features of the plant include (1) all possible safeguards against mechanical and electrical breakdowns, (2) a silo-storage capacity of 2,800 tons for night-shift coal, thus permitting the plant to work at peak capacity for one shift while the mine is on two shifts, (3) dedusting of the raw coal through the use of aspirator fans to remove minus 48-mesh fines, (4) recirculating a middlings product from the tables through the wet-washing circuits, (5) flexible loading and blending facilities to provide the company with greater latitude in marketing and (6) five 275-ton retail-coal silos which are loaded from the plant over a swinging stacker equipped with a 30-in belt conveyor.

The ultimate capacity of the plant is about 14,000 tpd, and space has been provided in the structure for the parallel units that will later be required to process this coal, Mr. Stelzriede pointed out.

FINE-COAL PREPARATION

Speakers and topics at the fine-coal preparation session included J. Visman, engineer, Mines Branch, Calgary, Alberta, who discussed evaluation of cleaning units; W. S. Sanner, U. S. Bureau of Mines, Schuylkill Haven, Pa., who presented factors in the design and operation of launder screens; and Shiou-Chuan Sun. associate professor, mineral preparation, Penn State University, State College, Pa., who described wetting agents in the flotation of coal. Co-chairmen of the session were R. E. Gilmore, Mines Branch, Ottawa, Ontario, and John Griffen, McNally Pittsburg Mfg. Co., Pittsburgh, Pa.

In the first of three papers, Mr. Visman discussed a method of evaluating cleaner performance which reduces the laboratory work to a minimum. The author pointed out that the method is particularly valuable because of the reduction in the number of float-sink analyses required for the clean coal and refuse products and elimination of the ash analysis for each of the fractions. Values of the resulting cleaning characteristics compared favorably with the conventional method, Mr. Visman reported.

Describing factors in the design and operation of launder screens, Mr. Sanner emphasized that they were not new, having been used for many years on river-coal dredges. The launder screen is stationary and consists of a wooden trough with baffles placed to form a well system. A fine-mesh screen covers the well system and each well is topped with an orifice. High-gravity fines and slimes are removed by the suction head developed at the orifices, Mr. Sanner explained. A study of seven plants using launder screens revealed that they are performing effectively under varying

(*Continued on p 162*)

FIRST-SHIFT FOREMEN at Shamrock No. 1 mine—Front row: L. Cochran (left), J. Jones, mine superinendent, R. C. Mitchell, P. Stricklin, J. Sparks. Middle row: R. Brown (left), mine foreman, T. Foley, L. Jones, F. Stone, T. Jones, J. Lowery. Back row: D. Yocum (left), H. Peak, C. Keith, T. Manning, R. L. Snead.

Truax-Traer Mine Sets Second Fatality-Free Record

MINING of over a million tons of coal without a fatal accident has been attained, for the second time, by employees and officials of its Shamrock No. 1 mine, Kayford, W. Va., the Truax-Traer Coal Co. announced recently. It makes the fourth time one of Truax-Traer's mines has passed the million-ton mark without a fatality. From Nov. 4, 1952, to Dec. 31, 1953, Shamrock No. 1 produced 1,008,371 tons, and in the period from November, 1949, to September, 1952, mined 2,207,168 tons, also without a fatal accident. The company's Racoon-5 Block mine produced 1,268,504 tons from January, 1950, to December, 1953, with a no-fatality record. Its Shamrock No. 2 operation mined 1,602,477 tons without a fatality from August, 1947, when it opened, until closed in 1952.

SECOND-SHIFT FOREMEN, Shamrock No. 1—Front row: L. Belcher (left), H. Workman, C. Workman, D. Giammerino, L. Grant. Back row: W. Toney (left), V. Davis, J. Belcher, B. Painter, I. O. Reynolds.

THIRD-SHIFT FOREMEN, Shamrock No. 1—Front row: C. K. Rose (left), T. Graham, C. Chapman, J. G. Bosley, federal inspector. Back row: T .Williams (left), N. Elswick, M. Mullens, E. Lambert, D. Farrell (C. Williams and O. Huffman, absent).

SAFEST MINES—Winner of the Big Sandy-Elkhorn institute's bronze plaque for the safest mine in the large-tonnage class in 1953 was the Republic mine of the Republic Steel Corp., represented in the left photo by Estill Collins (left), mine foreman, and John L. Coyer (center), superintendent, with M. E. Prunty, outgoing institute president. Accepting plaque for safest small-tonnage mines are officials of the Harold Fuel Co. (right photo): Dan S. Knausz, president; Mrs. W. F. Mandt, chairman of the board, and Mrs. Dan S. Knausz, vice president and secretary-treasurer.

Banner Year for Big Sandy-Elkhorn

SOME 328 MEMBERS and guests attended the Annual "Ladies' Night" meeting and banquet of the Big Sandy-Elkhorn Coal Mining Institute held in Wheelwright, Ky., Feb. 15, at which James Fleming, safety director, Elkhorn Coal Corp., Fleming, Ky., was elected president and installed along with other officers. Named vice presidents were: Irvin C. Spotte, superintendent, Princess Elkhorn Coal Co.; George E. Evans Jr., president, Glo Valley Coal Corp.; and Ward L. Reed, Turner Elkhorn Mining Co. J. H. Mosgrove was re-elected secretary-treasurer.

In 1953, with M. E. Prunty, safety director, Consolidation Coal Co. (Ky.), serving as president and Mr. Mosgrove as secretary-treasurer, coal-company members of the institute achieved the best safety record in its 17-yr history. Tons per fatality for the 16 previous years averaged 656,079, while in 1953 the tons per fatality was 1,716,997.

Carrying on an annual event, the institute awarded bronze plaques to the safest mines in the two classes. The Class A plaque went to Republic Mine of the Republic Steel Co. for producing 577,624 tons with only four lost-time accidents, and the Class B plaque to the Harold Fuel Co. for producing 80,821 tons without a single lost-time accident.

Two foremen, T. R. Simpkins, Republic Steel Co., and W. A. Pack, Inland Steel Co., won 9-yr buttons for supervising crews working without a lost-time accident for that period. Seven-year buttons went to Dewey Looney, of Consol, and Ballard McKinney, of Republic.

Other high awards announced included: 6-yr buttons, William Branham and Virgil Howard, Princess Elkhorn; Paul Moscrip, H. C. Daniles and C. R. Brummett, Inland Steel. 5-yr buttons, Drexel Webb, Consol; Warnie Short, Wilmar Branham and Harry Clay, Princess Elkhorn; Dock Fraley, EG&FA; J. P. Gibson, Inland Steel; Charles Calhoun, Utilities Elkhorn Coal Co.; and Ed Kincer, Elk Horn Coal Corp. Foremen winning 4-yr, 3-yr, 2-yr and 1-yr buttons numbered 20, 24, 36, and 97, respectively.

Directors of the Big Sandy-Elkhorn Coal Mining Institute for the coming year include: J. T. Parker, manager coal properties, Inland Steel Co.; M. K. Reed, superintendent, Liberty Elkhorn Mining Co.; J. E. Green, superintendent, Utilities Elkhorn Coal Co.; Arthur Bradbury, safety director, Inland Steel Co.; B. F. Fish, superintendent, South-East Coal Co.; Milton V. Bentley, superintendent, Consolidation Coal Co. (Ky.); William Crawford, vice president, Princess Elkhorn Coal Co.; Noah D. Howard, general superintendent, Elk Horn Coal Corp.; R. C. Collier, superintendent, Consolidation Coal Co. (Ky.); John L. Coyer, superintendent, Republic Steel Corp.; C. L. Sherman, superintendent, Stephens Elkhorn Fuel Corp.; M. M. McCormick, superintendent, Pond Creek Pocahontas Co.; C. H. Brown, office manager, Republic Steel Co.; A. M. Ayres, general superintendent, Russell Fork Coal Co.; M. E. Prunty, safety director, Consolidation Coal Co. (Ky.); and Elbert Asbury, safety director, Feds Creek Coal Co.

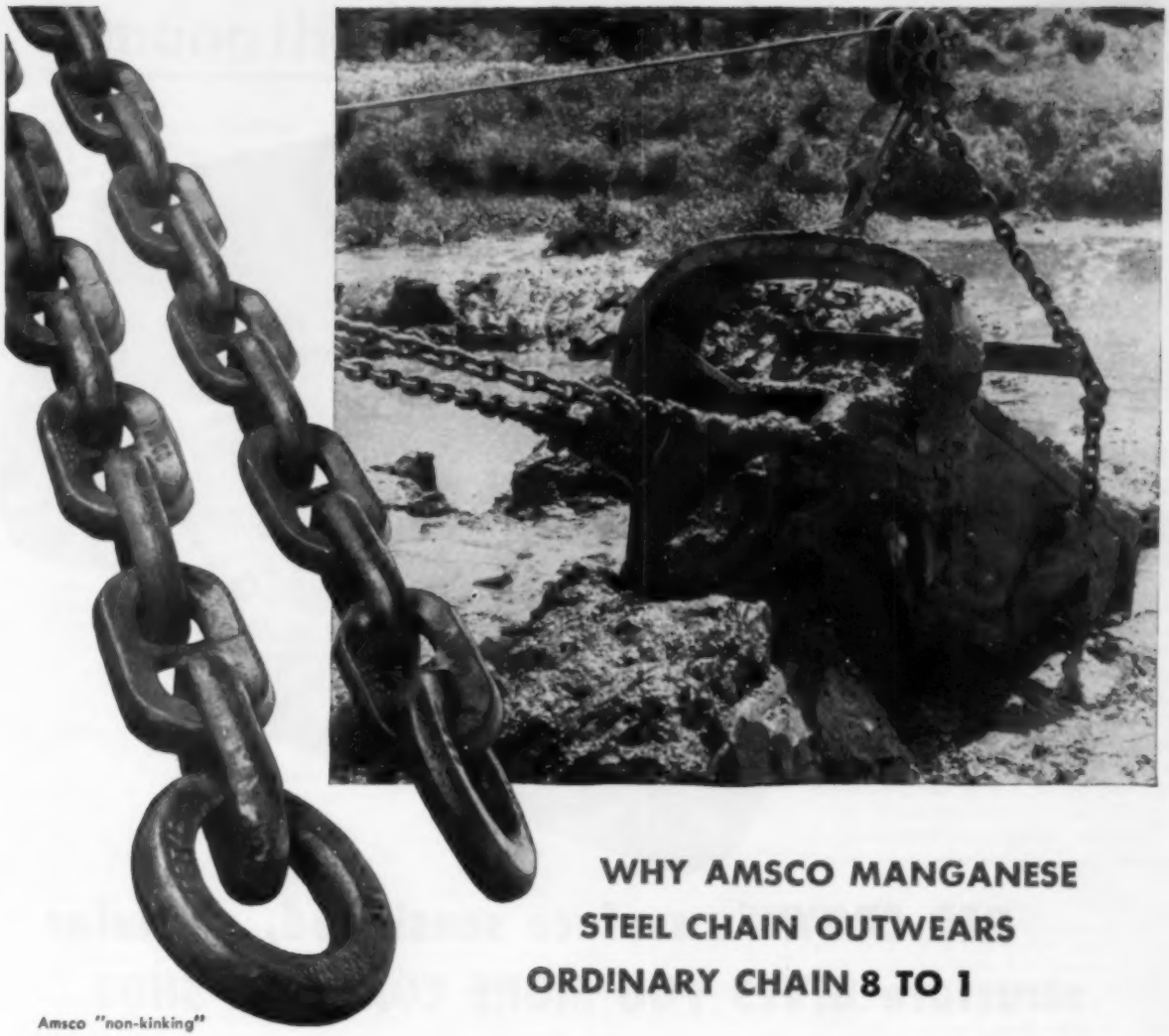
NEW INSTITUTE OFFICERS include: vice president, George E. Evans Jr. (left), Glo Valley Coal Corp.; president, James Fleming, Elkhorn Coal Corp.; and vice president, Irvin G. Spotte, Princess Elkhorn Coal Co.

EQUIPMENT APPROVALS

Two approvals of permissible equipment were issued by the U. S. Bureau of Mines in February, as follows:

Goodman Mfg. Co.—Pump unit, BM-433071; one 3-hp motor; 250 v, DC; Approval 2-984; Feb. 26.

Jeffrey Mfg. Co.—Type 76-A Colmol mining machine; three 50-hp motors; 220 v, AC; Approval 2-985; Feb. 26.



Amsco "non-kinking" manganese steel chain, one of many fine chains from which to choose.

WHY AMSCO MANGANESE STEEL CHAIN OUTWEARS ORDINARY CHAIN 8 TO 1

Amsco manganese steel chain resists impact and abrasion, because it is cast from the toughest steel known. Each link has extra metal on the link sides and ends where most of the abrasion occurs.

It work hardens right on your job. Tough service will develop a link hardness up to 500 Brinell. In addition, it will acquire a glasslike polish that helps eliminate life-shortening abrasion.

It has special link design to help keep abrasives out of the link-bearing area, thus materially extending service life and minimizing repairs and down time.

It is designed for specific jobs. A complete line of carefully designed Amsco manganese steel chains are available for dragline, bucket elevating, clinker drag, logging, etc.

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Chicago Heights, Ill.

RED CROWN's surface sensitized, granular structure GIVES YOU MORE COAL PER SHOT

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THE ONLY SURFACE SENSITIZED PERMISSIBLE

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CINCINNATI 1, OHIO

MAKER OF QUALITY EXPLOSIVES SINCE 1878

Among the Manufacturers

CF&I Advances Riddle

Colorado Fuel & Iron Corp. has appointed A. M. Riddle executive assistant to the president. As manager of the corporation's Market Research Dept. since 1942, Mr. Riddle has worked closely with administrative, sales, and operating personnel in the development of CF&I's broad program of expansion, modernization and diversification. In his new post, he will divide his time between the western and eastern divisions.

ESB Names Sales Heads

Electric Storage Battery Co., Exide Industrial Div., Philadelphia, has appointed four sales executives in the Midwest and Pacific Coast areas. Thomas H. Dooling, formerly Pacific Coast sales manager, has been promoted to western industrial sales manager in charge of the company's branches in Denver, Los Angeles, Seattle and San Francisco, as well as sales and service in Hawaii and Alaska. Herbert F. Sauer has been made midwestern industrial sales manager, responsible for the firm's branches in Chicago, Cleveland, Detroit, Kansas City, Mo., Minneapolis and St. Louis. C. W. Wilson, former assistant manager at Chicago, has been named to succeed Mr. Sauer as Chicago branch manager, and Willard W. Grundel has been appointed San Francisco branch manager. Mr. Dooling rounds out 50 yr in the field this year. Mr. Sauer joined Exide in 1905. Mr. Wilson has been with the firm since 1915 and Mr. Grundel since 1926.

Goodyear Advances Sales Heads

Goodyear Tire & Rubber Co., Akron, Ohio, has appointed Robert J. Burns, an industrial products field representative at Chicago since 1949, as St. Louis district manager for the Industrial Products Div., succeeding C. O. Roome, who has retired because of ill health. B. E. McClelland, field representative at Madisonville, Ky., succeeds Mr. Burns, and K. E. Reed, field representative at Jacksonville, Fla., succeeds Mr. McClelland. P. P. Percich, field representative at Chattanooga, Tenn., has filled the Jacksonville post, and H. V. Atkinson, of the Atlanta office, has replaced Mr. Percich.

Daniels Opens New Offices

The Daniels Co., Contractors, Inc., has opened offices in Indiana, Pa., and Clearfield, Pa., besides retaining its Hazleton, Pa., and Newark, N. J., offices. Company headquarters now are located in Indiana, Pa., from which the bulk of the bituminous industry will be served. Recent appointments announced by the company include John W. Hough, chief engineer; J. B. Richardson, general superintendent; A. E. Long, mining engineer; and C. M. Pohida, treasurer.

V-Corr Sales Head Named

Henry P. Seymour has been appointed by Bettinger Corp., Waltham, Mass., as manager of sales for V-Corr roofing and siding material, with headquarters in Toledo, Ohio. Mr. Seymour formerly was with the Republic Stamping & Enamel Co., as sales manager of its Vitric Steel Div.

Price Heads Norton Div. Sales

Norton Co., Worcester, Mass., has named Donald L. Price sales manager of the Abrasive Div. Mr. Price, who has been sales manager of the eastern region since 1952, started with Norton in 1920 and was Detroit district manager until 1949 when he was recalled to Worcester.

Gar Wood Appoints

Gar Wood Industries, Inc., has appointed David Byrd sales manager of its Richmond Div., Richmond, Calif., which manufactures a complete line of dump bodies and hoists. With the company since 1947, Mr. Byrd formerly was assistant sales manager of Gar Wood's Wayne Div.

Union Wire Rope Expands

Union Wire Rope Corp., Kansas City, Mo., in a program enlarging its Eastern Div., has announced opening of additional facilities for servicing customers at Pittsburgh and Philadelphia. In Pittsburgh, the office and warehouse is located at 845 Mumford St., and R. K. Cooke is district manager. In Philadelphia, office and warehouse is at 238 N. Delaware, and D. E. Bedford is district manager. Full lines of wire rope and slings will be carried at both branches to permit distributors to replenish their stocks from inventories which can be drawn on in a matter of hours.

GE Adds Locomotive Service

General Electric Co., Locomotive and Car Equipment Dept., Erie, Pa., has established a complete locomotive rebuilding and overhaul service as an addition to the 31 service shop facilities currently available to users of locomotives throughout the United States for the repair and modernization of transportation equipment. The new service will include all kinds of heavy maintenance and overhaul rebuilding, modernization, conversion, and wreck-rebuild work, and new locomotive warranties will be issued to operators of locomotives that are completely rebuilt by G. E. On locomotives, rebuilt or overhauled to customers' specifications, warranties will be issued to cover areas on which work was done. R. A. Miller has been named manager of manufacturing for the department, with responsibility for all activity relating to the physical construction of its products. Mr. Miller, who joined G. E. in 1923, had been manager of the employee relations section of the department prior to his appointment.

Plant Addition for Reliance

The Reliance Electric & Engineering Co., Cleveland, has placed contracts for a new plant addition to its Ashtabula (Ohio) Div. The building, a single-story 90,000-sq ft structure of steel, concrete and brick, will follow the architectural lines and duplicate the manufacturing capacity of the company's original Ashtabula plant, completed in 1947. The addition, increasing plant and office area to a total of 220,000 sq ft, will be used to produce the company's new line of AC motors built to new NEMA design standards.

Rapid Barge Unloading

PRACTICALLY ALL COAL used at the new Hennepin power station of the Illinois Power Co., 20 mi southwest of Lasalle, Ill., is unloaded from barges on the Illinois River by this specially designed equipment at an average rate of 450 tph, including barge shifting and cleanout. Constructed by the Dravo Corp., Pittsburgh, the facility has a rope-type trolley handling a 6½-ton clamshell bucket that operates along a 100-ft runway supported by the tower. One man controls the entire operation, and with a 35-sec free-digging cycle, the unloader can deliver some 670 tons of coal hourly.

Ohio Brass Official Retires

The retirement of Frederick Attwood as vice president in charge of the eastern territory has been announced by the Ohio Brass Co., Mansfield, Ohio, effective May 1. Mr. Attwood joined Ohio Brass in 1920 as general European agent and was made a vice president and director of the company in 1927. Though withdrawing from active duties with the company, he will continue to serve as vice president and director.

Joins Templeton-Matthews

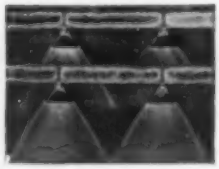
The association of William C. Ehinger with Templeton-Matthews Corp., Terre Haute, Ind., as chief mechanical engineer was announced last month by M. A. Matthews, president. Mr. Ehinger's technical and practical experience will supplement that of the Templeton-Matthews organization to further provide skilled technical services to the coal mining industry, Mr. Matthews reported.

SuperDuty Easily Excels in Coal Washing Efficiency

In the preparation of fine coal sizes, the SuperDuty Diagonal Deck Coal Washing Table easily excels any other table or process in common use today.

By combining the advantages inherent in the diagonal deck design with a smooth running head motion and a balanced, factory aligned underconstruction, the SuperDuty produces exceptionally large tonnages of "premium" production with minimum loss in the refuse.

So simple and efficient in operation is the SuperDuty that many coal producers, large and small, use it profitably in reclaiming values from culm banks, river deposits and waste piles. For full information, ask for Bulletin 119.



CONCENCO SPRAY NOZZLES

These handy nozzles are simple, flexible and economical. All you do is drill your holes, clamp on and get results. They can be definitely aligned for washing, sluicing or spraying according to need. They are removed or replaced in a moment's time.

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CONCENCO PRODUCTS

★ *The ORIGINAL Deister Company* ★ *Inc. 1906*

BWH Opens Chicago Warehouse

Boston Woven Hose & Rubber Co., Cambridge, Mass., has opened a new warehouse in Chicago, as part of a program designed specifically to enable Midwest customers to receive 24-hr service and delivery of Boston products. Several times larger than the former facilities, the new warehouse, located at 2651 Gardner Rd., Broadview, will stock a complete line of Boston products and is the third opened by Boston within the last 6 mo. The other new additions are at Dallas, Tex., and Atlanta, Ga. The Chicago distributor for Boston Woven Hose & Rubber Co. has announced its occupancy of new offices and warehouse facilities at 806 E. 31st St., LaGrange Park, Ill. With this move, made in the interest of more prompt and efficient customer service, the Boston Woven Hose & Rubber Co. of Pittsburgh, Chicago Div., ceases having its offices with the district office of the parent company.

B-E Expands Repair Service

Bucyrus-Erie Co., S. Milwaukee, Wis., has made available a new churn-drill tool repair service to blasthole-drill users in eastern states. Located at the Bucyrus-Erie sales and service station at 214-216 S. Dean St., Englewood, N. J., a new 5,000-sq ft plant addition has been erected to handle the new facilities which include machines capable of handling any type of drill-tool repair or reconditioning. Bucyrus-Erie will continue to offer sales at Englewood on drills, drilling tools, and replacement parts for rigs. R. D. Starr, district sales representative, heads sales and service personnel.

And for Your Information . . .

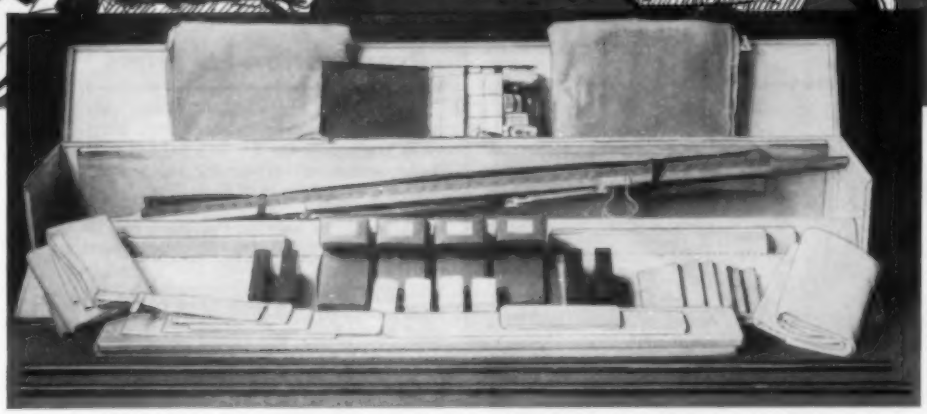
Atlas Powder Co., Wilmington, Del., has set up eight $1,000 college scholarships for science students, as part of the company's program to enable outstanding students to complete their scientific education and help meet some of industry's pressing needs for technical personnel. The awards will go to college students who will be seniors in 1954-55, majoring in chemistry, physics or any branch of engineering, and will be awarded on the basis of scholastic records and recommendations of the college staff.

Euclid Div., General Motors Corp., Cleveland, has appointed Charles B. Pace district representative in all counties in N. J. south of Mercer and Monmouth, all of Delaware, most of Maryland and eastern Pennsylvania. Mr. Pace, whose headquarters are in Devon, Pa., was for 7 yr a district representative for the Bucyrus-Erie Co. He succeeds William F. Myer, with Euclid since 1934, who will continue in a consulting capacity.

Flexible Steel Lacing Co., Chicago, has transferred John Bakke, who has been traveling the Midwest states for the past 15 yr, to the territory covering Michigan, Indiana, and western Kentucky, succeeding George W. Cramer who has retired after 32 yr of service.

Marion Power Shovel Co., Marion, Ohio, has named L. G. Currie, Canton, Ohio, district sales manager of its District 116, which covers the southern part

Increase your Team's chance of Winning with the M.S.A. CONTEST OUTFIT and TRAINING MATERIALS. . .



Your team gains greater speed and efficiency, both in training and in actual competition, with the M.S.A. Contest Outfit and training materials. All required materials are neatly arranged, easy to see, instantly accessible. This means you can select the right materials, at the right time and bring your team to a quick, point-winning solution to every accident problem.

The Contest Outfit box is made of strong steel and finished in white. Its design, resulting from years of experience with first aid practice and competition, prevents loss of materials, and contributes to neatness and efficiency. Strong handles on each end of the box make it easy to carry. Write for details.

CONTENTS

- 1 Army-Type Stretcher
- 2 Pieces Canvas 6′ x 8′
- 2 Single Wool Blankets
- 6 1 yd. Packages Picric Gauze
- 6 1 yd. Packages Sterile Gauze
- 1 1 oz. btl. Aromatic Spirits of Ammonia
- 1 Horn Spoon
- 6 Paper Drinking Cups
- 1 Metal Box for dressings
- 1 Set of 15 Wood Splints
- 1 Pair 4″ bandage Scissors
- 2 Army-Type Tourniquets
- 48 40″ Triangular Bandages, unsterilized
- 12 1″ Compress Bandages, unsterilized
- 12 2″ Compress Bandages, unsterilized
- 18 4″ Compress Bandages, unsterilized
- 2 7′ lengths ¾″ Pipe for improvised stretcher
- 4 Wood Blocks for heat applications
- 6 U. S. Bureau of Mines First Aid Manuals
- 2 Padlocks
- 1 Strong Steel Box, as illustrated

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Place your orders with us! Complete selection of knives, pen and pencil sets, wallets, raincoats, lighters, key cases, tie clips, and many others. Write for details.

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How to get high-production, mechanized loading with very little investment...

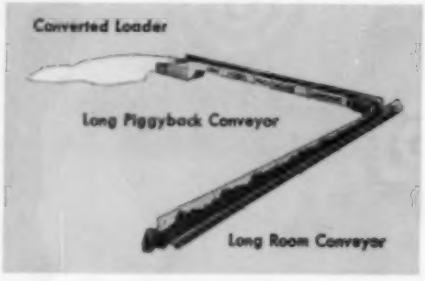
***CONVERT** your present outmoded equipment to*

LONG PIGGYBACK® CONTINUOUS HAULAGE MINING

Here's how it's done!

1 **8 BU loader is converted for use with the Piggyback* Conveyor.** The conversion process includes lowering the overall height of the 8 BU to 31½", plus installing a short boom and wider loading head. Long will make this low-cost conversion or you can do it in your own shop. Also, conversions are available for the 12 BU, 14 BU and other popular mobile loading machines.

2 **Add a Long Piggyback Conveyor and Room Conveyor.** The Piggyback—operating as the connecting link between the loader and the room conveyor—takes coal out as fast as it is produced. No waiting for intermittent transportation.



3 **Result—a highly mechanized loading system that assures** greatly increased production and reduced operating costs, yet requires a very small equipment investment.

In case after case, this unique method of converting to Piggyback mining has enabled companies to greatly increase their production at surprisingly low investment cost. In fact, mines now using chain conveyors and shortwall cutting may only need to purchase the Piggybacks and the loader conversion for complete, high-production mechanization.

*Trade Mark

For complete details, write us today.

The LONG Company
OAK HILL, W. VA.
Formerly Long Super Mine Car Co.

of Indiana and Illinois and parts of Kentucky. Mr. Currie has been a service and erection engineer for Marion for 7 yr.

Cummins Engine Co., Inc., Columbus, Ind., has opened its new 300-ft conveyorized production line, signaling the completion of the building portion of the company's $7 million postwar expansion program. The modern assembly line, housed in a completely air-conditioned, dustproof structure, illuminated to the highest industrial standards, facilitates careful assembly under strict quality control measures. To insure the smooth flow of components to the production line, machinery layout throughout the plant was rearranged, and many semi-automatic tools were replaced by new high-efficiency automatic equipment.

The Carver Pump Co., Muscatine, Iowa, has appointed L. C. Lane regional sales manager of the company's Midwest operations, with headquarters at W. Lafayette, Ind.

St. Paul Hydraulic Hoist, Mattoon, Ill., has appointed Timpte Brothers, Inc., Denver, Colo., distributor for the company's complete line, with exclusive sales and service rights for the state of Colorado and part of Wyoming. Part of New Mexico has been assigned to Timpte's branch office in Albuquerque.

Preparation Facilities

Buchanan County Coal Corp., Big Rock, Va.—Contract closed with Fairmont Machinery Co. for two 5x14-ft twin deck American Pneumatic separators; capacity, 80 tph of ½x0 coal.

Christopher Coal Co., Pursglove No. 15 mine, Pursglove, W. Va.—Contract closed with Fairmont Machinery Co. for addition to present plant of crushing equipment; capacity, 450 tph of R-O-M coal crushed to 5 in and under.

Compass Coal Co., Elk Creek mine, Philippi, W. Va.—Contract closed with Fairmont Machinery Co. for refuse dewatering and desanding screens.

Geo. W. Huss Contracting Co., Beaver Brook Mine, Beaver Brook, Pa.—Contract closed with Western Machinery Co. for installation of new 200-tph heavy media plant to recover anthracite from discarded bank material; including an 8x8-ft Wemco drum separator treating 150 tph of 4x$^{5}/_{16}$-in material; expected recovery of clean anthracite, 20% of feed; 50-tph of undersize to the plant to be dewatered in a 54-in Wemco coal spiral.

Jamison Coal & Coke Co., No. 9 mine, Farmington, W. Va.—Shipment by Deister Concentrator Co. of 16 No. 7 SuperDuty Diagonal-Deck coal-washing tables handling minus $^{3}/_{16}$-in fraction; and one Model 108 Concenco revolving feed distributor arranged for 16-way feed distribution to the 16 tables.

Cia. Carbonera Pallasca S. A., Peru, South America—Shipment by Deister Concentrator Co. of two No. 7 SuperDuty Diagonal-Deck coal-washing tables.

Wilmot Chain Will Replace the Same Size Number of Any Other Rivetless Chain

This complete interchangeability, coupled with the fact that Wilmot, as the originators of rivetless chain, offers the largest choice of sizes available are two reasons why an increasing number of leading firms are depending on Wilmot for conveyor replacements.

One company, operating five different kinds of rivetless chain conveyors, originally kept different replacement parts on hand for each conveyor. Today they maintain only two sizes of Wilmot chain in stock. Their saving in the cost of spare parts inventories has been gratifying. Additionally they have experienced a substantial shortening of "down" time.

Wilmot has, or will design, everything for your conveyor. Chain furnished in pitches from 3" to 10½" and in working loads from 3,000 to 130,000 lbs., of drop-forged steel, alloy, or cast chrome-manganese. As the originators, Wilmot has been largely responsible for the many auxiliary parts that today give these conveyors almost limitless applications: sprockets, traction wheels, flights, take-ups, shafting, bearings, casings and trough in cast iron, ductile iron, carbon or chrome-manganese steel.

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DENVER, COL. -- Kendo Equipment Co., P. O. Box 4202, So. Denver Station
HONOLULU 6, H. I. -- P. S. Pell & Co., Ltd., 88 S. Queen St.
INDIANAPOLIS 20, IND. -- Paul W. Huddlestun, 5745 Guilford Ave.
KNOXVILLE, TENN. -- Crowell Engineering & Sales Co., 3045 Sutherland Ave.
PITTSBURGH 16, PA. -- Harold C. Lusk, 3045 W. Liberty Ave.
PORTLAND 4, ORE. -- Peoria Chain Co., 103 S. W. Front Ave.
ST. LOUIS 5, MO. -- Jack Van Horn, 7543 Cromwell Drive
NEW YORK 38, N. Y. -- International Manufacturing & Equipment Co. (export only), 220 Broadway

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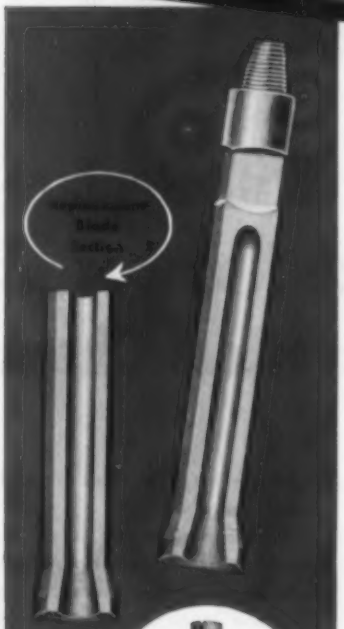
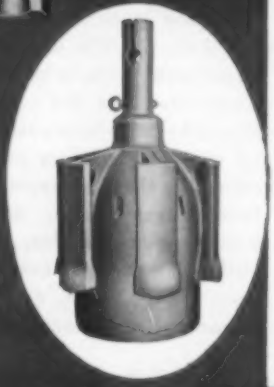
Drill More Holes Per Bit, At Less Cost Per Hole



SPANG CHURN DRILL BITS, famous for long life and economy in the drilling of blast holes for the fragmentation of minerals or overburden, drill *more-holes-per-bit* at *less-cost-per-hole,* because they are fully heat-treated from end to end and have the *extra strength in pin and blade sections* to stand up under the toughest drilling conditions. They are made with semi-dressed ends for quicker, easier finish-dressing, in High Carbon, A.I.S.I. 4340, and Spang Molloy Steel.

Available also, as an added economy, are SPANG REPLACEMENT BLADE SECTIONS in the same grades of steel, and uniform forge section, for welding to pin and collar sections of original bits when long service has worn the integral blade to a point where replacement is desirable.

Anyway you look at it, SPANG BITS are your best buy for more holes at less cost per hole.



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COAL MEN ON THE JOB . . .

JEWELL RIDGE COAL CORP., Blair Fork No. 4 mine, Tilford, Perry County, Ky. (left photo)—F. F. Stewart (left), superintendent; C. M. Reynolds, company preparation engineer; J. H. Graham, general mine foreman; and R. M. Bagenstose, division engineer for the company's Virginia mines.

REPUBLIC STEEL CO., Pike County, Kentucky (right photo)—C. H. Brown (seated, left), chief clerk, and W. N. Mullins, rodman; D. W. Thacker (standing, left), transitman, E. R. Elswick, transitman, and W. Rowe Jr., rodman.

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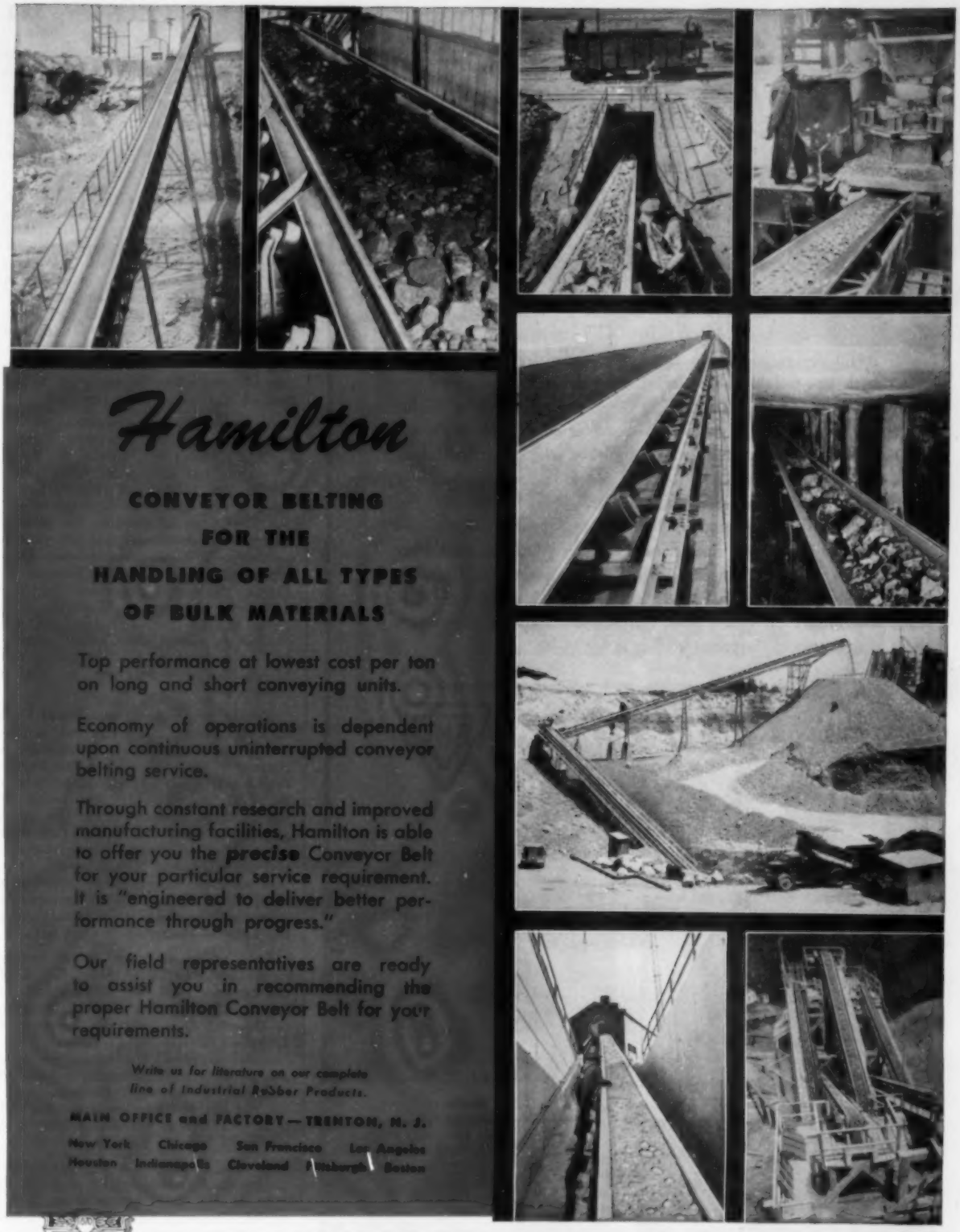

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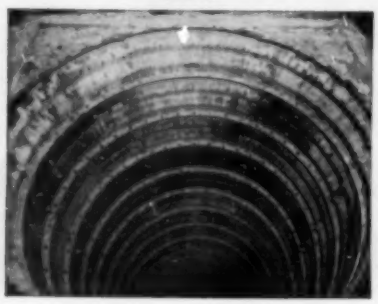


NEWS BRIEFS . . . From p 138

quired mines and river transportation facilities. With branches in Cleveland and Buffalo for many years, the company has been exclusive western agents for the Jamison Coal & Coke Co. for 25 yr and also handles the output of other mines, offering its own grade of washed coal called "Mekanikol."

A pilot plant at the coal tipple of the Bair-Collins Co., 30 mi east of Roundup, Mont., has successfully completed tests of the Hobson low-temperature process for the distillation of coal into char, oils and other chemicals, according to William Pringle, president of PDP Processing, Inc., operators of the plant. The one-tube plant built a year ago uses about 1 ton of coal an hour. Construction of four more tubes for commercial production is expected to be finished this spring, it is reported.

A special survey committee set up last month by the Chemung County Firemen's Association, Elmira, N. Y., to investigate the natural-gas safety situation is "one of the first positive moves by a county group to face up to the serious dangers inherent in the present distribution of natural gas in various areas which have changed over from manufactured gas," stated Norman C. Curtin, technical consultant for the Anthracite Information Bureau. In view of the recent natural-gas explosions in various cities, every community is entitled to the safeguards the Elmira committee will seek, Mr. Curtin pointed out.

Stockholders of the Pennsylvania Coal & Coke Corp. will be asked at the annual meeting May 3 to approve a change in the company's name to the Penn-Texas Corp. The change, which has been approved by the board of directors, is motivated by the company's expansion into fields other than coal, including oil and gas, shipping and manufacturing, it is reported. The coal division, which now provides a relatively small portion of the company's sales, will continue to operate under the name of Pennsylvania Coal & Coke.

Location of an underground factory in the recently closed Mine No. 3 of the Superior Coal Co., Gillespie, Ill., is being sought by Sen. Paul H. Douglas, of Illinois. In a letter to Secretary of Defense Charles E. Wilson, Sen. Douglas suggested the mine's use as a storage or factory unit being established under the government's program, pointing out that the mine is large, dry and well ventilated and also that there is a surplus of labor in the area.

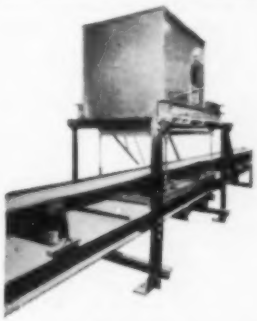
A new plant producing coal-derived chemicals for the textile industry is now being built at Spartansburg, S. C., by the Pittsburgh Coke & Chemical Co.

The National Labor Relations Board has ordered the H. R. Vanover Coal Co., Owensboro, Ky., to cease interfering with union activities of its employees and to reinstate with back pay four UMWA men discharged in May, 1952. The ruling, which affirmed the

COAL MEN ON THE JOB . . .

DAWSON DAYLIGHT COAL CO., Dawson Springs, Ky.—Ernest Peyton (left), chief electrician; Virgil Smith, superintendent; Homer Brown, Clint Morgan and Jordon Lanham, section foremen; Willie Stennett, assistant superintendent; Denver Hammonds, Marion Hammock and Maurice Wilkey, section foreman.

trial examiner's report based on a hearing in Owensboro in April, 1953, called for the company to discontinue discouraging its employees from unionizing or questioning them on their union activities.



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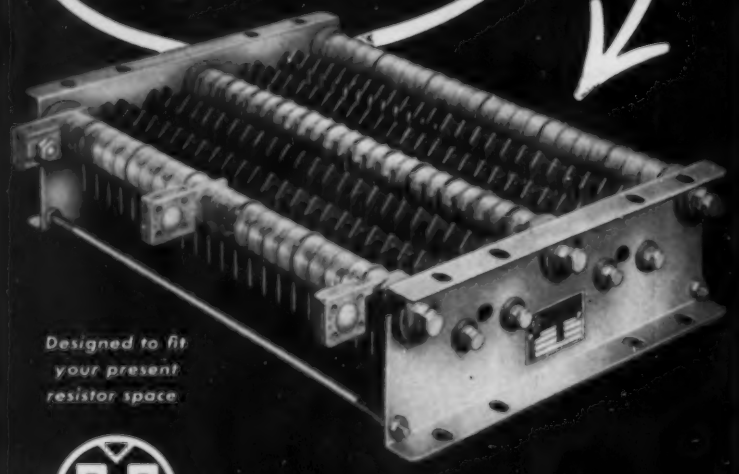

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Association Activities

W. Va. Group Names Officers

Marvin L. Alley, general manager, Gauley Mountain Coal Co., has been elected president of the Central West Virginia Coal Operators' Association, succeeding T. T. Rees. Joe L. McQuade, general manager, Donegan Coal & Coke Co., was named vice president. Brooks Callaghan was elected secretary, and Mr. Alley was selected to serve also as treasurer. Directors of the association named include: Mr. Alley, Dewitt C. Snyder, P. C. Bright, J. R. Maust and Lowell Copeland.

Somerset Officers Re-Elected

Marlin J. Weber, E. A. Siemon, C. B. Berkey Jr., and Martin L. Markel were re-elected president, vice president, treasurer and secretary-commissioner, respectively, at the annual meeting of the Somerset County Coal Operators' Association held in February in Somerset, Pa. Named directors, in addition to Messrs. Weber, Siemon and Berkley, were: C. C. Dovey, Cambria Fuel Co.; E. J. Newbaker Jr., Elma Smokeless Coal Co., Inc.; W. J. B. Mayo, Coal Div., Eastern Gas & Fuel Associates; Charles A. Merrill, Enterprise Coal Mining Co.; E. F. Saxman, Saxman Coal & Coke Co.; and Albert Swank, Hiram Swank & Sons and Acosta-Gray Coal Co.

Smoke Abatement Group Broadens Representation

Ezra Van Horn, executive vice president of the Ohio Coal Association, was elected chairman, and Harry G. Kennedy, secretary of the Kanawha Coal Operators' Association, was elected vice chairman at the first meeting of the enlarged executive committee of the Coal Producers' Committee for Smoke Abatement, held in Cincinnati, March 5. Now composed of a representative of every sponsoring coal producing district and railroad, the enlarged group was created last December at the annual meeting of the committee, of which H. B. Lammers is chairman and R. L. Ireland, vice chairman. As an indication of how the desire for cleaner air is accelerating, it was pointed out at the meeting that during 1953 the committee gave assistance to 30 cities and with 1954 still in its infancy, already has before it requests for help from 27 cities.

Members of the new executive committee and the organizations they represent are: P. B. Swing, Big Sandy Elkhorn Coal Operators' Association; G. S. Ward, Harlan County Coal Operators' Association; F. H. Davis, Hazard Coal Operators' Association; T. J. Hoffman, Kentucky Coal Agency, Inc.; J. W. Colley, Logan County Coal Operators' Association; Mr. Kennedy; E. C. Payne, Northern West Virginia Coal Association; Mr. Van Horn; H. S. Homan, Southern Appalachian Coal Operators' Association; G. H. Esser, Virginia Coal Operators' Association; H. F. Hebley, Western Pennsylvania Coal Operators' Association; J. J. Ardigo,

Appalachian Engineers Name Officers

NEWLY ELECTED OFFICERS of the Appalachian Chapter of the West Virginia Society of Professional Engineers include: Robert Daviss (left), consulting engineer, Beckley; Tom Howard, mining engineer, The New River Co., Mt. Hope; Ennis Nave, mining engineer, Long Engineering Co., Oak Hill; Paul W. Feigley, consulting engineer, Beckley; J. P. Hindsley, Gulf Oil Co., Beckley, outgoing chapter president; B. B. Corker, electrical engineer, Appalachian Electric Power Co., Beckley; and Lloyd G. Fitzgerald, mining engineer, USBM.

Operators' Association of Williamson Field; E. J. Kerr, Baltimore & Ohio R.R.; G. G. Ritchie, Chesapeake & Ohio Ry.; L. C. Goering, Louisville & Nashville R.R.; P. P. Belitz, New York Central System; and F. K. Prosser, Norfolk & Western Ry.

New Books for Coal Men

New Test for Carbonization

Low-Temperature Carbonization Assay of Coal in a Precision Laboratory Apparatus, by J. B. Goodman, Manuel Gomez, V. F. Parry and W. S. Landers. This

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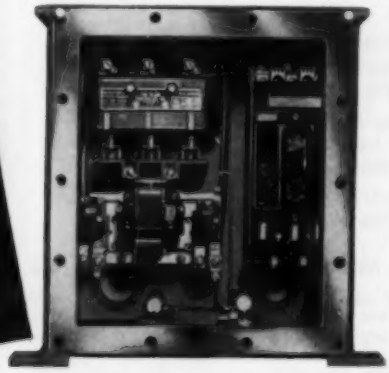

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booklet describes a new test procedure, especially useful for non-coking or weakly coking coals, that provides a complete collection and condensation system for solid, liquid and gaseous products of carbonization. *USBM Bulletin 530. 24 pp. 8x10½-in; paper. 55c, Supt. of Documents, Government Printing Office, Washington 25, D. C.*

How to Rate Your Company

Manual of Excellent Managements (1954). Out of some 4,000 companies in the United States and Canada, here is the list of the 348 that are best-managed. The report shows companies with the greatest growth potential, best records of stability of net income, best boards of directors and best cash dividend records, together with criteria for judging companies. Two coal companies, Pittsburgh Consolidation Coal Co. and Lehigh Coal & Navigation Co., are in the top 348. *96 pp. 8x10½-in; cloth. Free, American Institute of Management, 125 East 38th St., New York 16, N. Y.*

How Much Coal?

Coal Resources of the United States: A Progress Report, Oct. 1, 1953, by Paul Averitt, L. R. Berryhill and D. A. Taylor. Carrying forward work begun in 1947, this interim report estimates total recoverable reserves of coal in the United States at 949,870 million tons, based on the assumption that half of the total reserves will be recovered This latest estimate, based on new studies of the reserves in 10 states together with provisional and old estimates elsewhere, adds up to some 84% of total fuel reserves. Oil and gas represent about 2% each; oil shale, some 12%. At present rates of extraction coal is estimated to last 1,279 yr. *U. S. Geological Survey, Circular 293. 49 pp. 8x10½-in; paper. Free, Geological Survey, Washington 25, D. C.*

Controlling Longwall Roof

Roof-Movement Study of Mechanized Retreating Longwall Operation, Lancashire No. 15 Mine, Bakerton, Cambria County, Pa., by A. J. Barry and J. J. Wojciechowski. Here's the record of observations on strata movement accompanying mechanized longwall mining. With the possibility that longwall mining may spread in the United States, these data may be helpful in controlling roof in the years ahead. *USBM, R. I. 5028. 13 pp. 8x10½-in. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.*

Other Books and Booklets

Bibliography of Bureau of Mines Investigations of Coal and Its Products, 1945 to 1950, by E. P. Carman, M. Opperman, S. Nishiyama and L. Racoosin. USBM, Bulletin 528. 40c, Supt. of Documents, Government Printing Office, Washington 25, D. C.

Carbonizing Procedures With New Experimental Coke Oven, by J. B. Gayle and E. L. Gulledge. USBM, R. I. 5011. 12 pp. 8x10½-in; paper. Free, Publications Distribution Section, 4800 Forbes St., Pittsburgh 13, Pa.

Air Pollution Group To Hold 4-Day Meet

The 47th annual meeting of the Air Pollution Control Association, the only meeting in this country to be devoted exclusively to air pollution and its control, will be held at the Patten Hotel, Chattanooga, Tenn., May 3-6.

Some 600 management executives and other representatives of the industries, research scientists and air pollution control officials are expected to attend the 4-day meeting. On Monday, papers will be read and discussed on combustion of coal, micrometeorology, instruments and gas cleaning; Tuesday, odors, air pollution control problems, measurements and gas cleaning; Wednesday, air pollution control problems, incinerators, gas and air filtration and atmospheric pollution in general. The last day of the meeting is set aside for plant inspection trips. W. C. L. Hemeon, director of engineering, Industrial Hygiene Foundation at Mellon Institute, Pittsburgh, is chairman of the program committee.

Mines Bureau Issues 1953 Progress Report

The cooperation received from state mining officials, coal-mine management, and labor during the first year of operation under mandatory provisions of the new Federal Coal Mine Safety Act is emphasized in the annual report of the Bureau of Mines for the fiscal year ending June 30, 1953, released last month by Secretary of the Interior Douglas McKay.

Also highlighted in the report, in addition to developments in non-coal fields were improvement of methods for mining thick, steeply pitching anthracite beds, and further successful experiments in longwall mining of bituminous coal with an imported coal planer.

Over 6,000 regular and check inspections of mines subject to the Mine Safety Act's mandatory provisions were made during the year, but only 50 mines were affected by orders requiring withdrawal of men, according to the report. Although inspectors observed more than 7,500 violations of safety provisions during the year, over half of these were corrected immediately and most of the others were corrected within the time limit specified.

During the year, four states entered into cooperative agreements with the Bureau for enforcement of the new act.

Having shown that both coal hydrogenation and gas synthesis are practicable methods of producing synthetic liquid fuels from coal, according to the report, the Bureau shut down its demonstration plants at Louisiana, Mo., at the end of the fiscal year. Meanwhile experiments with improved catalysts at Bruceton, Pa., showed the possibility of developing a single-phase hydrogenation process to supplant the two-phase one used at Louisiana. Also, research at the Morgantown, W. Va., laboratories indicated that the cost of producing synthesis gas—carbon monoxide and hydrogen—might be reduced by gasifying coal under pressure.

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AIME New York Meeting

Begins on p 144

loads as auxiliaries in preparing feeds to, and products from, all types of anthracite fine-coal cleaning equipment, Mr. Sanner declared. The screen is particularly adaptable to No. 5 buckwheat. Simplicity, low cost, economy of operation, ability to perform under varying load and effective desliming are major advantages of the screens, Mr. Sanner concluded. J. D. Clendenin, U. S. Bureau of Mines, Schuylkill Haven, Pa., was co-author of the paper.

Results of tests with wetting agents in flotation of bituminous, anthracite and lignite coal were discussed by Shiou-Chuan Sun. Tests on minus 35-mesh bituminous coal were conducted with 235 different reagents. Results obtained included per cent recovery of coal when using each reagent, ash content in clean coal and recovery of pyrite. A series of 26 agents was used in making tests on minus 48-mesh anthracite coal and recovery and ash content were determined for each. Minus 48-mesh lignite was subjected to flotation tests with 14 agents and results tabulated. Other tests and results discussed by Dr. Sun included 17 experiments on the adsorbability of 48x65-mesh coal, cokes and quartz for Royox and Tween 81; effect of surface active agent and pine oil on the bubble pickup of 48x65-mesh Jeddo anthracite; and the effect of agent and pine oil on the bubble pickup of 48x65-mesh lignite. Delaskar Giraldo-Galvez, Penn State University, State College, Pa., was co-author with Dr. Sun.

MINING METHODS

Mining methods were discussed by three speakers at the Tuesday afternoon session. Co-chairmen were W. A. Lang, Research Council of Alberta, Edmonton, Alta., and W. W. Everett, vice president, Glen Alden Coal Co., Wilkes-Barre, Pa. Speakers were Andrew Allan Jr., Manu-Mine Research, Reading, Pa., who described induced caving of anthracite beds; A. Ignatieff, Department of Mines, Ottowa, Canada, who presented a paper written by H. Wilton-Clark, general manager, Coleman Collieries, Ltd., Coleman, Alta., on mining of pitching seams in the Canadian Cordillera; and James D. Reilly, vice president, Hanna Coal Co., Div. Pittsburgh Consolidation Coal Co., St. Clairsville, Ohio, who discussed the economic and psychological factors in successfully mining coal under heavy water-bearing strata.

In the lead-off paper, Mr. Allan explained the results from a modified sys-

NEWS of your company, personnel changes and other activities, are interesting to other Coal Age readers, so why not make it a point to tell us about them. Write The Editor, Coal Age, 330 W. 42nd St., New York 36, N. Y.

COAL MEN ON THE JOB . . .

BARNES & TUCKER CO.: John S. Todhunter (left), company production engineer, and Edward R. Arotin, faceboss, Lancashire No. 15 mine, Bakerton, Pa.

tem of block caving that was tried experimentally at a mine in the southern anthracite field as a part of a cooperative program between the U. S. Bureau of Mines' Anthracite Research Laboratory, and producing companies. As a result of these tests, Mr. Allan explained, considerable promise is shown for successful application of the method to recover coal from steeply pitching beds where conditions are favorable.

Experiments were conducted in a 14-ft bed consisting of a 6-ft bench of medium hard coal and an 8-ft top bench of soft coal. The bed had a dip of 70 deg and extended 328 ft above a rock gangway to the surface. The first 100 ft above the gangway was solid coal and the remainder had been mined previously by the breast and pillar method. In this experimental work, Mr. Allan continued, four men worked 504 man-shifts to recover 18,860 tons of material, an average of 33.5 tons per man-shift.

Results of the experiment, Mr. Allan noted, indicate that high-production low-cost mining is possible in steeply pitching anthracite mines; high recovery of available coal is possible; underground safety is increased; less explosives are required; and supply handling is simplified. Russell S. Davies, superintendent, Newkirk colliery, Philadelphia & Reading Coal & Iron Co., Tamaqua, Pa., was co-author of the paper.

In presenting H. Wilton-Clark's paper on the mining of pitching beds in Canadian Cordillera, A. Ignatieff, Department of Mines, Ottowa, Canada, outlined the mining conditions and methods used in the low-volatile field of British Columbia and Alberta. Up to 14,000 cfm of methane is liberated per ton of coal mined and presents a ventilating problem, Mr. Ignatieff declared. Mining methods vary from room and pillar to modified longwalls in which 250-ft blocks of coal

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COAL MEN ON THE JOB . . .

WINGERT CONTRACTING CO., INC., Butler, Pa.: Arthur Johns, mine superintendent.

are mined. In an effort to increase output per man-shift, equipment such as shortwall cutters, shaking conveyors with duckbills and belt conveyors have been installed in the producing sections. Compressed-air, battery and diesel locomotives have been used for main haulage.

There have been no outstanding production results from the mechanization, Mr. Ignatieff added, and output has been only 4.3 to 4.6 tons per man-shift. Some of the reasons pointed out for the somewhat unimpressive results are difficulty of moving machinery on pitches and in tight places, and payment of workers as company men rather than on an incentive rate. In conclusion, Mr. Ignatieff noted some of the equipment needs as lightweight machines capable of moving on the pitch and suggested that an auger-type machine may have possibilities.

Discussing the economic problems of mining under heavy water-bearing strata, Mr. Reilly emphasized the need for cooperation between management and labor in applying engineering principles. Mr. Reilly pointed out the extremely difficult problem facing mine management at a mine near Terre Haute, Ind. A marginal mine, which in event of a water break with ensuing heavy inflow could not afford to lose any appreciable quantity of materials or machinery, and which must continue working and continuously increase productivity, posed a real problem for management. To build up confidence in the workers and gain cooperation, management placed the facts before the local union officials and sought suggestions from individuals as well. Management was successful in selling the plan to the workers and the mine made gains, Mr. Reilly continued. Production increased from 280 tons per machine shift to 480 as a result of cooperation between management and workers. In conclusion, Mr. Reilly stressed that the successful operation of the mine would not have been possible without good employer-employee relations and proper handling of workers.

CONTINUOUS MINING

Theme of the Wednesday morning session was continuous mining, with speak-

ers as follows: J. E. Elkin, general superintendent, coal department, Duquesne Light Co., Pittsburgh, Pa., on the use of an auxiliary exhaust fan to improve ventilation and dust control in continuous-miner sections; A. L. Lee, owner and chief engineer, A. L. Lee & Co., Columbus, Ohio, on remote controls for continuous mining; and W. E. Hess, manager of mines, Vesta-Shannopin Coal Div., Jones & Laughlin Steel Corp., California, Pa., on pillar extraction in the Pittsburgh seam using continuous-mining machines. J. V. McKenna, deputy secretary, Pennsylvania Department of Mines, Harrisburg, Pa., and W. J. Rude, manager—coal, American Gas & Electric Service Corp., New York, were co-chairmen.

Line brattice has not been satisfactory in providing desirable ventilation over continuous-mining faces, Mr. Elkin said, in pointing out that such curtains are difficult to seal at high spots in the roof and sometimes act as regulators to reduce the total amount of air in the split in which they are employed. For these and other reasons, Mr. Elkin explained, Duquesne Light Co., at its Warwick No. 2 mine, Greensboro, Pa., is operating an auxiliary exhaust fan with flexible tubing under tentative approval of a commission of Pennsylvania mine inspectors and officials of the Bureau of Mines.

In actual operation, the 3-ft Aerodyne fan has been effective in passing 4,500 cfm at 2.3-in wg through 280 ft of 24-in tubing. The fan is installed in the last open crosscut, with its motor and controls on the intake side of a check curtain and the exhaust opening of the fan on the return side of the check. A bypass curtain is provided in the check to permit air to flow naturally when ventilation is meeting requirements.

The flexible tubing is supplied in 6-ft lengths and is suspended from wood headers used in Warwick's roof-bolting system.

In the discussion, S. M. Cassidy, vice president, Pittsburgh-Consolidation Coal Co., Pittsburgh; and A. Lee Barrett, research and development engineer, Joy Mfg. Co., Pittsburgh, commended both the mining officials of Duquesne Light Co. for their safe, ingenious and practical solution to the problem and the mine inspectors and USBM officials for their open-mindedness in the matter. Mr. Barrett pointed out that such methods may ultimately result in the elimination of water in dust suppression.

Probing the possibilities for more automatic mining, Mr. Lee suggested that the highwall experiments of Carbon & Carbide Chemicals Co. and Mech Mining Co. (*Coal Age*, December, 1952, and January, 1954, respectively) might be adapted to underground use for remotely-controlled extraction. Improvements in television transmission and lighting may permit an operator to guide his machine from a considerable distance outby the face. Semi-remote control also is a possibility, with the operator perhaps 50 ft from the machine, thus eliminating some of the timbering delays that must be tolerated under present systems. New projections and continuous haulage are

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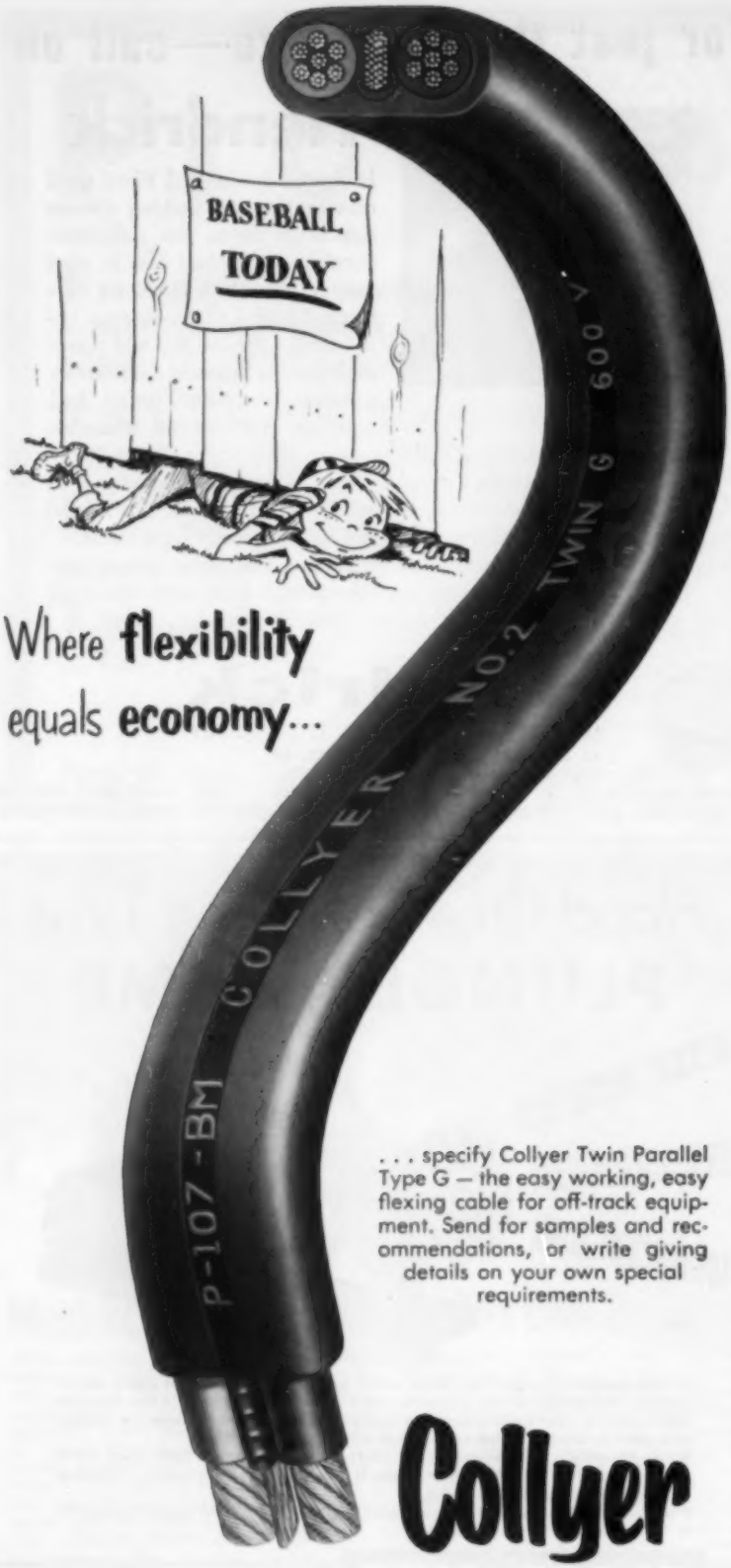

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necessary, of course. And the future may bring ideas for having the mining machine itself carry ventilating equipment as it advances, Mr. Lee declared.

Demands for highest-possible recovery of high-grade metallurgical coal from the Pittsburgh seam led officials of Jones & Laughlin to investigate the possibility of of recovering pillars. Continuous mining provided the answer, since it permitted short pillar lines and concentrated operations, and resulted in better supervision and roof control, Mr. Hess said.

Comprehensively covering the factors leading to the adoption of different methods and the abandonment of some, Mr. Hess explained that the short pillar lines resulting from pillar recovery by continuous methods eliminated many of the roof problems that would prevail if attempts were made to keep open enough working places for conventional units in a pillar section.

In the discussion, it was brought out that continuous mining has permitted full extraction in areas where this has never before been done in hand mining or conventional mining.

STRIPPING OPERATIONS

Long-distance belt-conveyor transportation, lignite stripping and highwall drilling were the subjects of papers presented at the Wednesday afternoon session. Speakers were J. L. Thornton, manager, coal division—belting sales department, Goodyear Tire & Rubber Co., Akron, Ohio; W. B. Roe, geologist, Truax-Traer Coal Co., Chicago, Ill.; and Jason Harmon, general superintendent—stripping, Hanna Coal Co., St. Clairsville, Ohio. J. Robert Bazley, president, J. Robert Bazley, Inc., Port Carbon, Pa.; and R. H. Swallow, chief engineer, Ayrshire Collieries Corp., Indianapolis, Ind., were co-chairmen.

The transportation of bulk material in huge quantities at a high rate over grades up to 32% is economically feasible for distances of 100 mi or more as easily as for 10-mi system, Mr. Thornton stated, in setting forth the advantages of belt transport over other methods of haulage. Among the particular advantages listed by Mr. Thornton are safety, independence of climate variations, ease of maintenance, and "crow-flight" transportation inherent in the ability of belt conveyors to negotiate steep grades. Mr. Thornton concluded with descriptions of several long-distance belt projects, including the Colonial mines system of the U. S. Steel Co.; the slope belt at Orient No. 3 mine, Chicago, Wilmington & Franklin Coal Co.; the Shasta dam project in California; and the projected River-Lake 103-mi system in Ohio.

The history of lignite mining in North Dakota and Saskatchewan, producers of 98% of North America's lignite, was traced by Mr. Roe in a discussion of the changes in methods and equipment in the lignite industry. Present trends are toward large shovels and draglines for overburden-removal, and toward loading and truck haulage, Mr. Roe said. Overburden requires no shooting, but the lignite must be blasted because its natural toughness makes it difficult to load as exposed. Several tower excavators now

are in use in the region removing up to 30 ft of cover, Mr. Roe said.

Using slides and a motion picture to illustrate drilling and blasting methods at Hanna strip operations, Mr. Harmon pointed out that the company changed to vertical drilling in 1951 because of increasing depth of cover and to secure better fragmentation, reduced vibration effects, better opportunities for placement of charges and to reduce traffic congestion in the pit. In exposing the 54-in Pittsburgh No. 8 seam, Hanna uses vertical rotary air drills which average about 300 ft of hole per shift in the 80-ft. cover, which includes three hard strata, sandstone and limestone.

The drills have been modified by the addition of a longer mast to accommodate 40-ft drill stems, a change from 7⅞-in bits to 8⅛-in bits, a 10% increase in the speed of the fan and the addition of a cable reel holding 1,000 ft of trailing cable. Average life of the bits is about 5,000 ft of hole, Mr. Harmon reported.

PREVENTING GOB FIRES

Control and prevention of gob fires and the pay-off in cleaner air and better public relations was the subject of the Wednesday afternoon session on air and water pollution. The panel discussing the problem and its solution included Henry F. Hebley, Pittsburgh Consolidation Coal Co., who shared chairman's duties with T. S. Spicer, Penn State University; W. L. Nelson and E. P. Hall, Mellon Institute; G. H. Kennedy,

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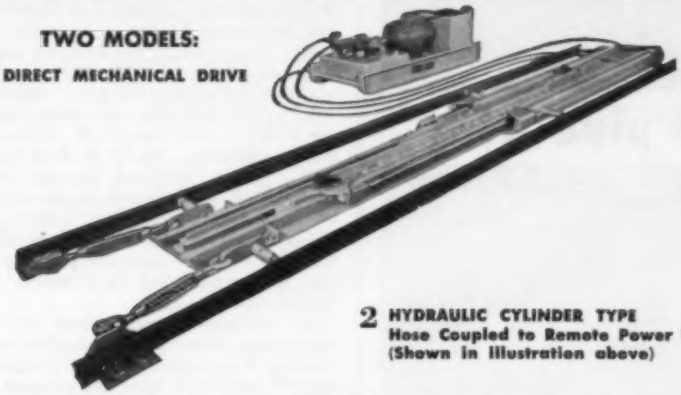

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COAL MEN ON THE JOB . . .

DAWSON DAYLIGHT COAL CO., Dawson Springs, Ky.: G. A. Stokes, mining engineer.

Rochester & Pittsburgh Coal Co.; T. G. Ferguson, Pittsburgh Coal Co., whose paper was presented by V. D. Hanson, of the same company; and J. A. Younkins, coal department, Duquesne Light Co.

Dr. Nelson, who presented the paper prepared jointly with Dr. Hall, pointed out that fire frequently occurs in coal-refuse piles regardless of whether they are built by aerial tram, larry, incline or truck. However, improved methods of piling refuse, involving layering compacting and sealing, make it possible to store refuse safely today. In fact, Dr. Nelson explained, using slides to illustrate his remarks, most old refuse piles can be reconstructed to minimize the danger of fire.

Mr. Kennedy, speaking from 5 yr of experience with two refuse piles near Indiana, Pa., suggested several steps to prevent ignition of gob. These steps include: (1) prevention of segregation of various sizes in refuse; (2) laying down refuse in layers; (3) compacting layers to a depth of 1 to 6 ft, depending upon the reactivity of the refuse; and (4) sealing layers with clay. Cost of layering, compacting and sealing varies from 1 to 8c per ton of refuse, he said.

Mr. Hanson, speaking for Mr. Ferguson, told how old burning gob fires have been extinguished and how fire has been prevented in new refuse piles by contouring to zero (i.e., rounding off all slopes so that loaded trucks can travel on any part of the pile) and then compacting with a bulldozer and sheepsfoot roller, followed by a specially constructed roller weighing some 15 tons. To help in compacting, truck drivers are instructed to follow a different route to the dumping area with each load. The sheepsfoot roller, attached to the rear of a tractor, is dropped over the edge of the slope to compact the edges and an ingenious edge roller has been developed to compact refuse to a distance of 15 ft below and above terraces.

At the Warwick mine, Duquesne Light Co., refuse-pile edges are not sealed but are compacted, Mr. Younkins said. Piling

is done in successive parallel laterals about 1,000 ft long and some 15 ft high. As a lateral is laid out, layers are compacted while refuse is dumped on the next succeeding lateral. Laterals are built up and out until they merge lengthwise. Disposal costs run about 26c per ton of refuse. If the edges were sealed, costs would rise about 10c, Mr. Younkins said.

UTILIZATION AND SALES

Non-fuel uses for coal and better training for coal salesmen were the subjects of the utilization session Thursday morning, with Earl C. Payne, Pittsburgh Consolidation Coal Co.; and Carl Lesher, consultant, presiding. Speakers were Dr. R. C. Johnson, vice president—research, Anthracite Institute; Dr. H. J. Rose, vice president and director of research, Bituminous Coal Research, Inc.; and W. W. Bayfield, executive vice president, American Coal Sales Association.

Certain characteristics of anthracite—for example, density of carbon, noncaking qualities, high ash-fusion temperature, low sulphur content and low reactivity—make it an ideal material for many non-fuel uses, said Dr. Johnson. Discussing these fields of use briefly, Dr. Johnson touched on the following:

1. **Filtering**—AnthraFilt, selling for $20 to $30 per ton, has many applications in water-supply and industrial processes. AnthraAid, a new companion product, competes with diatomaceous earth in acid and alkali processes.

2. **Metallurgy**—Anthracite in various forms and sizes is useful in sintering iron ore, as a blast-furnace additive and cupola fuel, and as an aid in zinc reduction and zinc-oxide manufacture. It also makes an excellent liner for aluminum cells.

3. **Carbon products**—Anthracite is useful in making refractories, electrodes, graphite powder, microphone and telephone carbon, and activated carbon.

4. **Filler material**—Rubber, plastics and foundry facings.

5. **Gasification**—Pulverized anthracite yields good synthesis gas when made with oxygen. Low sulphur content and low volatile content simplify gas-purification problems.

Well over 1,000,000 tons of anthracite now is consumed annually in non-fuel uses, and these markets are growing, Dr. Johnson concluded.

Vast reserves, low cost, wide availability and inherent chemical values make bituminous a useful material in non-fuel processes, Dr. Rose said. Besides, he stated, the physical and chemical characteristics of bituminous make it a flexible and adaptable raw material. The several ways in which coal is treated to produce widely varying effects and products are as follows:

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COAL MEN ON THE JOB . . .

BARNES & TUCKER CO.: Joseph Sherwin, tipple foreman, Lancashire No. 15 mine, Bakerton, Pa.

gas and synthesis gas—all are important products. In the future, high-Btu synthesis gas doubtless will replace natural gas in pipelines. Each 1% of natural gas replaced by synthesis gas will require 3,000,000 tons of bituminous per year.

4. **Combustion**—By-products of combustion are useful in industry: carbon dioxide for food processing; cinders for cinder-block manufacture; ash for aeration of clay soils; flyash as a replacement for Portland cement in concrete; flyash as a road binder and choker; flyash and ash (via electro-thermal reduction) as a possible source of alumna and (by other treatment processes) as a possible source of rare metals, such as germanium.

5. **Electro-thermal reduction**—Produces calcium carbide from coke and silica carbide for abrasives.

6. **Hydrogenation**—Yields 30 to 35% of liquid products, though still controversial as to cost.

7. **Mild oxidation**—Produces organic acids.

8. **Hydrolysis**—Produces hydrocarbons, fatty acids, phenols and nitrogen compounds.

9. **Miscellaneous**—Other treatments of coal yield an almost pure carbon or graphite for chemical processing; absorbent materials to remove objectionable oils from plant effluents; resins and other chemicals (by means of solvent extraction); and electrodes.

Much also can be recovered from the by-products of mining and cleaning coal, Dr. Rose explained. These materials include block stone, red dog, lightweight aggregate made from shales, bricks and fireclay made from clay underlying coal seams, pyrites and other minerals. But the industry needs more technical development and more research to open up these new non-fuel markets for bituminous, he said.

Summarizing 7 yr of work on sales training programs for coal men, Mr. Bayfield explained that the aim is to teach salesmen to talk intelligently to customers and explain their problems to

combustion engineers. Turning to the two 14-day courses offered at Penn State University and Purdue University last summer, he pointed out that the program, worked out by ACSA and faculties of the two schools, covered some 40 case problems, mostly from industry experience. Subjects included: properties and analyses of various coals and the significance of tests in making a sale; combustion theory and practice; hand-firing stoker performance and maintenance; pulverized-coal burners and cyclones; boilers and heat transfer; fuel selection; auxiliary equipment; tests for fuel performance; storage and coal- and ash-handling; and competitive fuels and their equipment. Results of the course, reflected in letters received from salesmen several months after completion, are increased confidence for salesmen and more and better sales, Mr. Bayfield concluded.

ELECTROCARBONIZATION AND COAL RESERVES

Electrocarbonization of coal and other hydrocarbons underground and a summary of new findings about coal reserves in the United States featured the closing session Thursday afternoon, with Dr. W. R. Chedsey, University of Illinois, presiding. Speakers were Dr. J. D. Forrester, University of Missouri School of Mines, who presented a paper prepared jointly with T. C. Cheasley, vice president, and Erich Sarapuu, research director, Sinclair Coal Co.; and Paul Averitt, U. S. Geological Survey.

Electrocarbonization is an underground gasification process whereby raw mineral fuel (coal, shale and petroleum) is made to yield its fuel constituents—volatile matter and fixed carbon—by application of electricity, Dr. Forrester explained (*Coal Age*, January, 1954, p 122). In addition to coal deposits, other kinds of natural fuel deposits appear to lend themselves to exploitation by underground electrocarbonization. Laboratory experiments and field experiments with an oil well in Indiana indicate that depleted oil fields and oil-shale deposits may be made to yield their fuel resources by this method, Dr. Forrester declared.

Conservative assumptions and additional categories for classification mark the new survey of coal reserves now being conducted by the U. S. Geological Survey, Mr. Averitt said. The survey has been completed for 10 states—Indiana, Michigan, Montana, New Mexico, North Carolina, North and South Dakota, Virginia, Wyoming and Illinois. In these states, with a rough total of about one trillion tons, approximately 87% of the measured reserves lie less than 1,000 ft below the surface. Abut 6% of the trillion tons is measured, 27% indicated and 67% inferred. Some 31% of the bituminous beds are over 42 in thick, 27% range from 28 to 42 in and 42% range from 14 to 28 in. Out of the trillion tons, only 3% is measured reserves in thick beds under light overburden. Mr. Averitt explained, however, that the small proportions classified as measured reserves reflect lack of data, not lack of coal.

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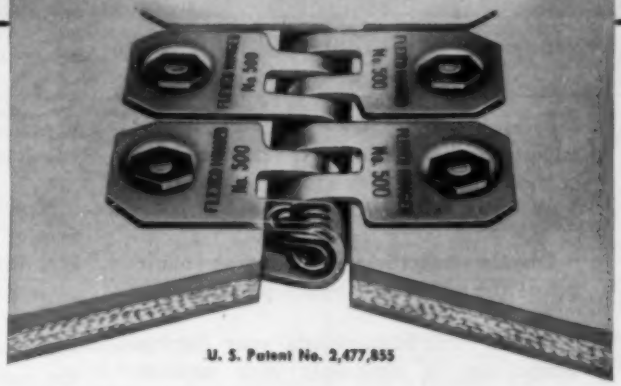

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McGRAW-HILL
PUBLISHING COMPANY, INC.
330 WEST 42nd STREET, NEW YORK 18, N. Y.

PROFESSIONAL SERVICES

ALFORD, MORROW & ASSOCIATES
Consulting Engineers
Coal Mine Operation, Preparation
Prospecting and Development
Property Valuation
Oliver Bldg. Pittsburgh 22, Pa.

HENRY O. ERB
COAL PREPARATION CONSULTANT
Plant design and Operation
Sales Engineer for
"WANUCO" Water Neutralizing Process
P. O. Box 867 Terre Haute, Ind.

DAVIS READ
CONSULTING ENGINEER
Layout—Operation
Modern Production Methods
Plant Design — Preparation
120 S. LaSalle St. 225 E. Noel Ave.
Chicago 3, Ill. Madisonville, Ky.

ALLEN & GARCIA COMPANY
42 Years' Service to the
Coal and Salt Industries and Consultants
Constructing Engineers and Managers
Authoritative Reports and Appraisals
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FERGUSON-GATES ENGINEERING CO.
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Coal Property Reports — Valuation — Development
Plant Design — Ventilation — Dust Surveys
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Telephone 5731 Beckley, W. Va.

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Designing Engineers—Consultants—Builders
MODERN COAL PREPARATION PLANTS THRU
"CO-OPERATIVE ENGINEERING"
906-08 Sycamore Bldg. Terre Haute, Indiana

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Consulting Engineers
Cost Analysis — Valuations
Mine and Preparation Plant Designs
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50 Years
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to Coal Mines
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332 S. Michigan Ave. Chicago 4, Illinois

PAUL WEIR COMPANY
MINING ENGINEERS and GEOLOGISTS
CONSULTANTS and MANAGERS
DESIGN and CONSTRUCTION
20 North Wacker Drive Chicago 6, Illinois

EAVENSON, AUCHMUTY & SUMMERS
MINING ENGINEERS
COAL OPERATION CONSULTANTS
VALUATION
2720 Koppers Bldg. Pittsburgh 19, Pa.

HERBERT S. LITTLEWOOD
CONSULTING ENGINEER
Application—Supervision of Installation
Maintenance—Inspection—Testing
POWER-HAULING HOISTING VENTILATION
R. D. #3, Irwin, Pa.

J. W. WOOMER & ASSOCIATES
Consulting Mining Engineers
Modern Mines Systems and Designs
Foreign and Domestic Mining Reports
National Bank Building Wheeling, W. Va.
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CLASSIFIED SEARCHLIGHT SECTION ADVERTISING

EMPLOYMENT • BUSINESS • OPPORTUNITIES • EQUIPMENT—USED or RESALE

UNDISPLAYED RATE:
$1.20 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.
POSITION WANTED undisplayed advertising rate is one-half of the above rate, payable in advance.
PROPOSALS, $1.20 a line on insertion.

INFORMATION:
BOX NUMBERS care of publication count as 1 line additional.
DISCOUNT OF 10% if full payment is made in advance of four consecutive insertions of undisplayed ads (not including proposals).
EQUIPMENT WANTED OR FOR SALE Advertisements acceptable only in Displayed Style.

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The advertising rate is $10.20 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request. AN ADVERTISING INCH is measured ⅞ inch vertically on one column, 3 columns—30 inches—to a page. C.A.

NEW ADVERTISEMENTS: Address N.Y. office, 330 W. 42 St., N.Y. 36, for May issue. Closing April 19th.

Your inquiry will have special value . . .

If you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but, more important, it will identify you as one of the men the advertiser wants to reach with this message . . . and help to make possible enlarged future service to you as a reader.

COAL COMPANY
PRODUCTION OR INDUSTRIAL ENGINEER
SOUTHERN WEST VIRGINIA
College graduate in Industrial Engineering. At least three years experience in Industrial Engineering techniques applied to Heavy Industry. Salary commensurate with education and experience. Please give complete details of experience, education and salary requirements in first letter. Write P-1918 Coal Age 330 W. 42 St. New York 36, N. Y.

REPLIES (Box No.): Address to office nearest you
NEW YORK: 330 W. 42nd St. (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

BUSINESS OPPORTUNITY

Strip Coal Wanted
Lease or purchase—large or small tracts. Morgan Coal Company, 2850 North Meridian Street, Indianapolis 8, Indiana.

ANYTHING within reason that is wanted in the field of Coal Age can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

STRIP MINING OPPORTUNITY
We have favorable leases on 10,000 acres of coal land carrying Glen Mary coal seam in Scott County, Tennessee. Also have railroad siding with crushing and tippling facilities. Interested in selling to someone who wants to operate at once. Deal can be handled for less than $30,000.00 Contact G & R Coal Company, Robbins, Tennessee, Phone 182F31 or 166R.

FOR LEASE

1—Model 4500 Manitowoc Dragline with 120 ft. Boom and 6 yard Bucket
3—Euclid Trucks, 15 Ton end dump
3—D8 Caterpillar Tractors complete with Bulldozers
2—TD 24 International Tractors complete with Bulldozers
2—LP Scrapers
1—20 Yard Wooldridge Scraper
All of above equipment is in first class condition and available at once

NUGGET COAL & TIMBER COMPANY
603 Midland Savings Bldg.
Denver, Colorado — Phone TAbor 0986

BARGAINS IN

7—Practically new Jeffrey 35-L permissible type, 250 V Cutting Machines, 7½' cutter bars, 18" high, recently purchased new. Offered at a very attractive price.
1—200 KW G.E. Synchronous Rotary Converter, Type HCC-6-1200, 275 V, complete with switchboards and switchgear, including ITE Automatic Reclosing Circuit Breaker and Transformers, 2300/4100 V. Just released. Offered at our usual low price.
2—150 KW G.E. Synchronous Motor Generator Sets, 275 V, 1200 speed, Type MPC-ATI, 2300 V. At attractive prices.
1—29-U Rubber tired Jeffrey Cutting Machine, 9' bar. Recently rebuilt. Open type. Good condition.
7—11BU-8E Joy Loading Machines, 250 V, open type. Just taken out of service.
1—Jeffrey Aerodyne Fan, Type 8H-48, with G.E. Tri-clad totally enclosed 150 HP induction motor, 125,000 CFM at 3" water gauge.
1—Practically new 12 x 22 complete Bradford Coal Breaker.
2—Late type HM-829 13-ton G.E. Locomotives, 250 V, 32" high, 42" gauge, contactor controls. Timken roller bearing journals, completely rebuilt.
5—6-ton G.E. HM-835 Locomotives, cable reel, 29" high, 15,000 series, Timken roller bearing journals, 42" gauge.
7—Completely rebuilt 250 V 15-ton Jeffrey, 13-ton Jeffrey, 20-ton Jeffrey, 15-ton Goodman, and 13-ton Goodman Locomotives. All rebuilt. From 26" to 44" gauge.

Other items such as Tipples with Washers, Single and Double Drum Hoists from 200 to 900 HP, Shuttle Cars, etc., are available.
Send us your inquiries.

COAL MINE EQUIPMENT SALES COMPANY

FRANK J. WOLFE PHONE L.D. 34 SHELDON J. WOLFE
TERRE HAUTE, INDIANA

TRANSFORMERS (1 ph. 60 cy.)

KVA	MAKE	Pri. V.	Sec. V.	Qx.
200	Pgh.	22000	220/440	3
125	West.	11000	2300	3
100	G.E.	2300/4160	230/460	3
75	G.E. (Pyranol)	2400/4160	120/240	3
25	G.E.	2300/4160	230/460	3
50	Allis	2300	115/230	3
50	G.E.	2300	230/460	3
37½	G.E.	11000	230/460	3

MOTOR GENERATOR SETS

600 KW G.E. 275 v. 900R MPC-ATI 2300/4000 v.
400 KW West., 550 v. 720R-Syn.-SK 2300/4000 v.
300 KW West., 275 v. 1200 R-Syn. 2300 v.
300 KW G.E. 275 v. 1200 MPC-ATI 2300/4000 v. Full automatic.
200 KW G.E. 275 v. 1200-MPC-ATI 2300/4000 v.
200 KW Ridg. 275 v. 900R-Syn. 2300 v.
150 KW G.E. 275 v. 1200 R MFC-ATI 2300/4000 v.
100 KW Ridg. 275 v. 1200R-Syn. 2300 v.
50 KW G.E. 275 v. 1200R. MPC-Sq. Cs. 2300/440v.
35 KW.G.E. 125 v. 1750 R. RC-KT 220/440 v.

ROTARY CONVERTERS

2—500 KW G.E. 275 v. HCC6-1200R. 13,200 v.
300 KW G.E. 275 v. HCC6-1200R. 2300/4000 v.
300 KW G.E. 275 v. HC12-900 R. 2200/400 v.
300 KW West. 275 v. 1200 R. 2300/4000 v.

Will rewind transformers to your specifications
AC & DC REBUILT MOTORS—Any size

MOORHEAD ELECT. MACH'Y CO.

P.O. Box 7991C — Pittsburgh 16, Pa.

RELAYING RAIL

All Sizes
Track Accessories

LEFTON INDUSTRIAL CORP.

General Office: 212 Victor Street
St. Louis 4, Missouri

-TRANSFORMERS-

BOUGHT AND SOLD

We carry a large stock of transformers, and invite your inquiries. New Transformers built to your specifications.

PIONEER TRANSFORMER REBUILDERS

We rewind, repair and redesign all makes and sizes.
One Year Guarantee.

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
SINCE 1912 CINCINNATI 27, OHIO

LOCOMOTIVES: 2—65 ton diesel electric, standard gauge, 0-4-4-0, in guaranteed condition. For sale or rent.
2—75 ton and 85 ton, electric, standard gauge, 600 volt, D.C.

LOCOMOTIVE CRANE: Link Belt 25 ton, standard railroad gauge, gasoline powered, air brakes, cast steel trucks, bucket handling, with or without 1¼ yd. clam shell bucket. For sale or rent. Located Minnesota.

MINE HOIST SPECIAL: Nordberg 1200 H.P., 1400 FPM, one drum clutched, wraps 1100 ft. 1¾" rope in one wrap, complete with motor and all auxiliary equipment.

A. J. O'NEILL

Lansdowne, Pa.
Phila. Phones: MAdison 3-8300 — 3-8301

PRICED to SELL:

150 & 200 KW, 1200 rpm, 275 volts DC. C/W. 6 ring, 60 cycle, syn. converters, with transformers & switchboards.
500 KW (3) 600 volts DC, type HCC, Form P, G.E. bare converters.
Transformers: Power & Distribution.
Rotary converter transformers rewound to required specifications.

Secure our prices before you buy.

R. H. Benney Equipment Company
5024 Main Avenue, Norwood 12, Ohio
Cincinnati Phone: Melrose 1108

FOR SALE

(excellent condition)

44 All Steel Mine Cars, A. C. & F., Rotary Dump, 42" gauge, 12' x 6' inside, 3' high & 14' long, 139 cubic feet level full. 48" W. B. Timken Bearings, Blueprint.

Also, Locomotives, Fans, Pumps.

Can be seen any time at Robin Hood Mine, Princess Dorothy Coal Company, Twilight, Boone County, West Virginia. 12 miles south of Madison.

THE CHESAPEAKE & OHIO RY. CO.
P. O. Box 509, Huntington, W. Va.
Call: Huntington 28268 or Whitesville 3016.

FOR SALE
42" GAUGE
DOROTHY GORDON MINE NEAR VAN, W. VA.

150—Composite cars (end dump)
2—Goodman Shortwalls
2—8 BU Joy Loaders
1—150 KW Rotary, G. E.
1—200 KW Rotary, G. E.
1—13 Ton Locomotive, G. E.
3—6 Ton Jeffrey Locomotive, Jeffrey
Also: Pumps, Fans, Derricks, Drills, etc.

WESTERN POCAHONTAS CORPORATION

P. O. Box 509, Huntington, W. Va.
Call: Huntington 28268

Ironton
Electric Locomotives

New and used.

The Ironton Engine Company

Farmingdale, New Jersey

NEW and REBUILT
STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Tons 18" to 56½" Track Gauge.
GREENSBURG MACHINE CO.
Greensburg, Pa.

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2 TELEPHONES $25.75

Inter-communication handsets, two wire system. Included Two 3 volt batteries, 50 ft. of wire and simple wiring instructions. Additional wire 1 cent per ft. or $25.00 per mile. Complete list of telephone parts, handsets, magneto—common battery — and dial telephones, switchboards, etc. Write:

Telephone Engineering Co., Dept. 4F4, Simpson, Pa.

RAILS

We are interested in purchasing used rails and mining equipment from abandoned mines.

M. K. FRANK

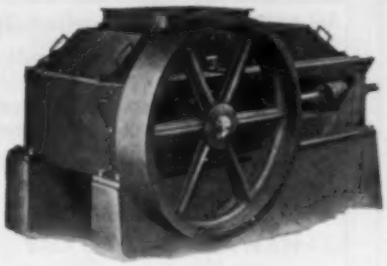
480 Lexington Avenue, New York 17, N. Y.
401 Park Bldg., Fifth Ave., Pittsburgh 22, Pa.
We also carry new rails and accessories in stock

WIRE ROPE
FOR SALE

2—1,250 Ft. Pcs. 1-⅝" Roebling Locked Smooth Coil Track Strand Wire Rope for Aerial Tramway. NEW—NEVER USED. Apply to THE SNAP CREEK COAL COMPANY, P.O. Box No. 1029, or Tel. 1533, Logan, West Virginia.

WORLD'S LARGEST INVENTORY

MOTORS—GENERATORS—TRANSFORMERS
New and Guaranteed Rebuilt
1 H.P. to 2500 H.P.
ELECTRIC EQUIPMENT CO.
P. O. BOX 51, ROCHESTER 1, N. Y.



COAL CRUSHERS

1—18" x 18" Jeffrey single roll
1—24" x 24" Jeffrey single roll
1—24" x 36" McNally-Pittsburg double roll
1—36" x 42" double roll
1—30" x 16" Williams pulverizer
1—36" x 48" Jeffrey hammermill

TUGGER & SLUSHER HOISTS

1—5 HP Brownie room hoist
1—5 HP Sullivan RH room hoist
1—7½ HP Sullivan double drum slusher hoist
2—10 HP Sullivan 3 drum slusher hoist
1—Ingersoll-Rand mod. 6HC air tugger hoist
2—6½ HP Sullivan tuggers, 250 v. DC
7—6¼ HP Sullivan double drum, 250 v. DC
1—10 HP Sullivan double drum driven by Continental gasoline engine

BOX CAR LOADERS

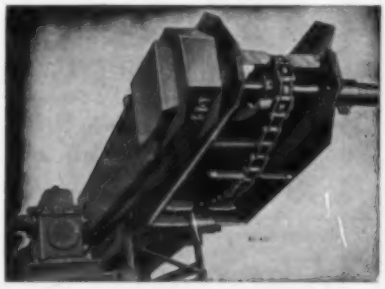
3—Ottumwa 20 HP box car loaders
2—Manierre 22 HP box car loaders
1—Jeffrey 20 HP box car loader
2—Red Devil portable loaders, 12'x15"
1—Card portable loader, 11'x19"

SCRAPER CONVEYORS

1—Link Belt, 50' centers, 12" flights
1—Jeffrey, 75' centers, 9" flights
1—Jeffrey, 67' centers, 30" flights
1—Jeffrey, 70' centers, 30" flights
1—Jeffrey, 72' centers, 30" flights
1—Jeffrey, 88' centers, 36" flights
1—Jeffrey drag, 28' centers, 9" drags
1—Jeffrey drag, 26' centers, 30" drags

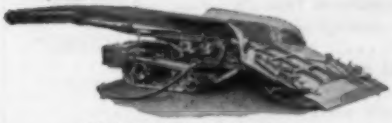
ROTARY DUMPER

1—Card rotary car dumper, 13'x5' platform



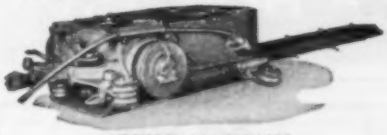
ELECTRIC HOISTS

1—11 HP Vulcan #0 single drum
1—20 HP Vulcan single drum
1—22 HP Vulcan double drum
1—25 HP Vulcan single drum
1—30 HP Vulcan single drum
1—37 HP single drum
5—50 HP single drum
2—60 HP single drum
4—100 HP Box single drum
1—112 HP Vulcan single drum
1—145 HP Vulcan single drum
2—150 HP Vulcan single drum
1—375 HP Box Single Drum Hoist, 800 FPM with 375 HP GE Slipring Motor, 575 RPM, complete with controller, grids and magnetic contact panel.
1—600 HP Box Single Drum Hoist, 25,000# Rope Pull, 900 FPM, Hydraulic Post Breaks with 600 HP Westinghouse Slipring Motor, 435 RPM, controls and magnetic contact panel.



LOADERS & CONVEYORS

1—8BU Joy loader
1—61EW Jeffrey elevating chain conveyors
1—61HG Jeffrey chain conveyor, 90'
1—61W Jeffrey chain conveyor, 200'
9—G-20 Goodman shaker conveyors
6—G-15 Goodman shaker conveyors
8—Vulcan shaker conveyors
2—Joy ladel UN-17 shaker conveyors
10—Goodman HA duckbills



MINING MACHINES

2—7B Sullivan super short wall coal cutters
18—CE7 Sullivan coal cutters
1—CR3 Sullivan coal cutter
1—Jeffrey 28A coal cutter
6—Goodman 112-A coal cutter
1—Sullivan CH-11 ironclad shearing machine
1—Jeffrey 29-C Arcwall coal cutter

SCALES

3—100 ton Fairbanks railroad scales
1—100 ton Howe railroad scale
1—125 ton Howe railroad scale
1—5000# Fairbanks Tipple scale with weighing basket
1—5000# Howe Tipple scale

SCREENS

5—3'x5' Tyler "Hummer" electric vibrating screen
1—42"x72" Jeffrey-Traylor electric vibrating screen
1—48"x84" Jeffrey-Traylor electric vibrating screen
1—40"x100" Tyler-Niagara 2 deck shaking screen
2—4'x12' Tyler Ty-rock 3 deck shaking screen
1—2 deck shaking screen, 18'x86"
1—4 deck shaking screen, 32'x84"

PIT CARS

125—60 cu. ft. Card steel coal mine cars 36" ga.
88—66 cu. ft. Card steel coal mine cars 36" ga.

SHUTTLE CARS

2—Joy Shuttle Cars, Model 42D5.

RAIL

We have in stock good relaying rail, 16# to 90# also new 16# to 20# with fittings.

STORAGE BINS

2—50 ton capacity steel bins

CAGES AND HEAD SHEAVES

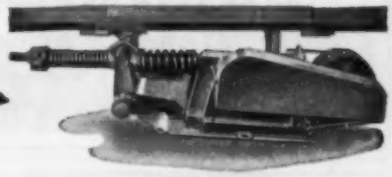
2—Card automatic self-dumping cages, 5'4" x 9'6" platform
2—108" Card bicycle sheave wheels
2—96" wood filled sheaves
2—84" Card bicycle sheave wheels
3—72" bicycle sheave wheels

MINE FANS & BLOWERS

2—8-H Jeffrey 42" Aerodyne fans
1—7' Jeffrey Aerovane 2 stage fan
2—Jeffrey #61 exhaust blowers
7—Jeffrey Aerodyne midget blowers
1—2600 cfm Brown-Fayro exhaust blower
2—3000 cfm Claridge exhaust blowers

PICKING TABLES

1—Link-Belt, 20' centers, 18" pans
1—Card, 41'6" centers, 30" pans
1—Card, 51' centers, 48" pans
1—73' centers, 30" pans
1—64' centers, 48" pans



ELEVATORS

1—Link-Belt, 42' centers, 6"x4" buckets, single chain, complete with steel housing
1—Link-Belt, 36' centers, 18"x8" buckets, double chain
1—12' centers, 14"x7" buckets on belt
1—35' centers, 10"x5" buckets on belt

BELT CONVEYORS

1—Jeffrey 24"x13'
1—Barber-Greene, 24"x66'
1—Barber-Greene, 24"x135'
1—Barber-Grene, 30"x173'

LOCOMOTIVES

1—2 ton Whitcomb, battery, 24" ga.
2—2½-3½ ton Mancha battery, 24" ga.
1—4 ton Westinghouse-Baldwin battery, 24" ga.
1—4 ton Ironton, battery, 36" ga.
2—7 ton G.E. permissible battery, 36" ga.
1—7 ton Atlas, battery, 36" ga.
3—8 ton Ironton battery, 36" ga.
2—8 ton G.E. battery, 36" ga.
2—8 ton Goodman battery, 36" ga.
4—10 ton Atlas battery, 36" ga.
1—3 ton Whitcomb gas engine driven, 24" ga.
1—2½ ton Jeffrey trolley, 36" ga.
1—4½ ton Goodman trolley, 36" ga.
1—5 ton Jeffrey trolley, 36" ga.
1—6 ton Goodman trolley, 36" ga.

Send for free copy of illustrated booklet describing the famous Allen Lamp collection.

Since 1898 Dependable Reconditioned Machinery

MORSE BROS. MACHINERY CO.

2900 BRIGHTON BLVD. EST. 1898 DENVER 1, COLO.

EQUIPMENT FOR SALE

GORGAS COAL MINE — GORGAS, ALABAMA

Used mining equipment in operating condition when removed from service at time No. 3 Mine operations curtailed in 1953 and 1954. All equipment subject to prior sale. It can be inspected at the Gorgas Mine of the Alabama Power Company, Gorgas, Alabama (Walker County):

Quan.	Description	Price
4	Joy 11-B short wall mining machines, Government approved, 50 H.P., 250 Volt D.C. motors with 7½ Ft. cutter bars	$1,750.00 Ea.
4	Joy 7-B short wall mining machines, Government approved, 50 H.P., 250 Volt D.C. motors with 7½ Ft. cutter bars	2,000.00 "
3	Joy 12-BU permissible loading machines Type 7E	4,250.00 "
6	Goodman Type 12AA Standard mining machines with 7½ Ft. cutter bars	450.00 "
1	Goodman Type 112AA Universal mining machine with 7½ Ft. cutter bar	450.00 "
	Also *new* surplus repair and supply parts consisting of:	
1	Lot of parts for 61 AM Jeffrey chain conveyors	
1	Lot—for Goodman shaker conveyors G 12½ and E 1½ Duckbills	
1	Lot—for LaDel shaker conveyors U-17 and UN-17 Models	
1	Lot—for Goodman 212AA mining machines	
1	Lot—for 12AA Goodman mine machines	

(For sale in lots at 35% of present day list price)

ALABAMA POWER COMPANY
Mining Dept.
Birmingham 2, Ala.

WANTED — Immediately

Capstan, Endless & Winch type Carpullers.
Railroad Car Shakeouts with motors & hoists.
Mine Hoists in various capacities & speeds.
Barney Hoists, Sgl. & Dbl., with motors.
Sgl. & Dbl. Roll Crushers.
Overhead Hoists & Cranes.
R.R. Car Shakeouts

HAWKINS & COMPANY
6338 No. California Ave.
Chicago, (45) Illinois

WANTED

250'—400' complete Coal Conveyor
32"—48" Wide, for above ground use
WRITE WIRE PHONE
A. HELLER
210 Snediker Ave., Brooklyn 7, N. Y.
HYacinth 3-0800

UNUSUAL
MINE CARS FOR SALE

100—44" gauge, 46 wheel base
14" wheels, 6' wide, 12 long (inside)
14'1½" overall. 30" High, Drop Bottom
American Car & Foundry
Condition A-1, Comparatively New.
Capacity 120CF.
Priced to Use Not Rust.
Phone, wire or write

BROWN EQUIPMENT COMPANY
BOX 699, MIDDLESBORO, KENTUCKY
Phones 1382-1383

FOR SALE

Complete 30-ton per hour coal briquette plant located at Fort Scott, Kansas. If not sold as a whole soon will sell by the piece.

Plant consists of:
2—drag type undertrack car unloaders
3—bucket elevators
1—rotary dryer, 5 Ft. x 30 Ft.
1—crusher, coal pulverizer, 40 tons per hour
1—3 Ft. x 4 Ft. x 38 Ft. pug mill type mixer
1—No. 16 Webb briquette press
2—4 Ft. cooling conveyors, metal belt, total 284 Ft. of conveyor.

All of above include electric motor drive.

A. G. Sherwood Construction Co.
Independence, Kansas

FOR SALE

1 Used Koehring 1005 high lift shovel, 2½ yard general purpose shovel dipper; crawlers, 186" x 120", with 42" shoes, with extra heavy counterweight; with 6DC1879 Buda Diesel Engine, with self raising high A frame; with Kohler light plant with flood light equipment; with shovel boom light at boom point. Excellent condition.

For further information write:

Allied Construction Equipment Company
4015 Forest Park Avenue
St. Louis 8, Missouri

Walking draglines, 3 to 12 yds., diesel, elec.
Whirley portal and barge type cranes (3).
Locomotives, diesel, gas, 7 to 50 tons (7).
Mack 32-ton diesel LRSW rear dump trucks (11).
Bucyrus 42T blast hole drills, 9", elec.
Rotary dryers, kilns, 8x120, 54"x40', 7x125.
Shovels, cranes, dragls., 1½ to 10 yds. (15).
Euclid 25-ton bottom dump coal haulers (5).
H. Y. SMITH CO.
828 N. Broadway Milwaukee 2, Wis.

1—Goodman Trencutter—712—AC
1—No. 8 Myers Whaley Automat — with set of armored belts for rock work
1—Joy T-2-8 Mining Machine Trunk — DC — with cable reel
4—Loeb's—G.E. 10T, Jeffrey 5T, Goodman 5T.
4—Shepard Niles Hoists AC—3—S—7½ HP
Adjustment on Freight to Eastern points
PEERLESS COAL CO., INC.
Newhouse Bldg., Salt Lake City, Utah

DIESEL ENGINES • GENERATOR SETS
All Sizes—10 KW to 2000 KW—AC and DC
ALL UNITS FULLY GUARANTEED
"We Own What We Offer"
AG SCHOONMAKER CO., INC.
50 CHURCH ST NEW YORK 7, N. Y.
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National Business Exchange
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(1) NEW portable 5 KW gasoline driven generator set. Hercules engine—4 cyl.—30 HP—radiator cooled—electric starting—marine enclosure. GENERATOR: Schramm 5 KW 110 volts DC 45.5 amps.—1750 rpm—serial No. 86N228—Model 5HCD.

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CUrtis 7-5050

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1—Joy Continuous Miner, low vein.
3—14BU low pedestal Loaders, 10 H. P. Motors. Type 7AE.
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3—12BU, 9E latest type Loaders.
2—8BU Loaders, one 33½" high.
1—11BU Joy Loader, hi-capacity.
2—Joy T2-5 low pan Cat Trucks.
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1—Joy T1 Standard Cat Truck.
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6—Joy 6SC four wheel drive Shuttle Cars, rebuilt. Elevating discharge.
4—32E15 Shuttle Cars, all hydraulic, rebuilt.
3—42E Shuttle Cars, as is or rebuilt.
2—32E10 Shuttle Cars, perfect.
6—Joy PL11-14 Elevating Conveyors, rebuilt.
1—Joy 7B Cutting Machine, new.
2—Joy Belt Feeders, PL12.
General Electric & Westinghouse Rotary Converters, 100 to 300 KW.
G.M.C. & Caterpillar 75 and 100 KW Diesel Plants. 250 DC volts.
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3—Baby Goodman 212AA Cutting Machines.
Jeffrey 35L, 35B, 29C, 29L Cutters.
58 Locomotives of all types.
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2—HGD Hoists, Brown Fayro.
2—MSA Rock Dusters.
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5 Gallon G.I. Gas & Water Cans.
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2400 feet—16" O.D. Ditto .344W

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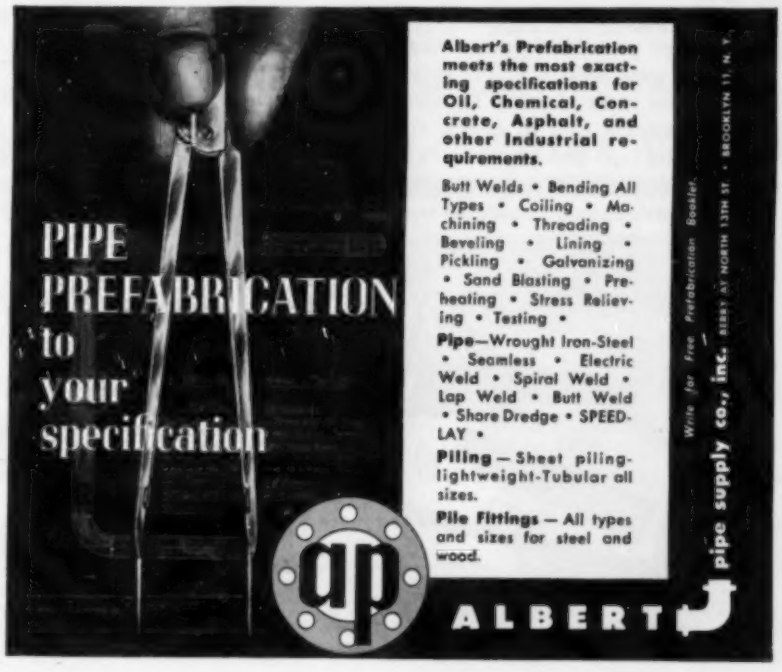
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One of a series of advertisements prepared by THE ASSOCIATED BUSINESS PUBLICATIONS

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MINIMUM CLEANING COST-
3¼¢ PER FOOT
HYDRAULIC CYLINDERS CONTROL
HEIGHT OF DIGGER PLATE AND BOOM
BLADES CLEAN BOTH SIDES OF TRACK

the "Canton" TRACK CLEANER

. . . fabulous money maker of the whole Mining field —Hard and Soft Coal — Iron Mines — Copper Mines — Potash Mines — Salt Mines.

Proved self-liquidating, short time.

"CANTON" QUICK ON CABLE SPLICERS

. . . are *life savers* . . . pound around spliced cable for perfect electric bond—on the job. No down-time.

In writing, please use street and zone no's.

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AMERICAN MINE DOOR CO.

2057 Dueber Ave., Canton 6, Ohio

Rock Dusters • Switch throws • Car Transfers • Signal Systems • Automatic Doors

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. . . Here is GUARANTEED MAGNETIC PROTECTION for INDUSTRIAL and PROCESSING USES!

MAGNETIC PLATES—Std. widths 4" to 26"; Lengths and number of poles as required. Specials on order.

MAGNETIC PULLEYS—Std. diameters 12" to 30"; Belt widths from 4" to 60". Larger sizes on order.

MAGNETIC PULLEY UNITS—Pulley sizes from 12" to 30" dia., belt widths 4" to 60". Length of unit as desired.

MAGNETIC DRUMS—Std. diameters 12" to 30"; Face widths 4" to 60", with or without enclosures.

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—anywhere

"We look into the earth"

PENNSYLVANIA Drilling CO.

DRILLING CONTRACTORS AND MFRS.

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"Sutton" SAND DRYING STOVES

Provides low cost, efficient dryng of sand for railroads, mines, quarries and industrial plants. Can be fired with coal, gas, or oil. Write for free literature and prices.

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950 Oak Street
Indiana, Penna.

To the Employee Relations Director of every American company

LET'S FACE IT . . . the threat of war and the atom bomb has become a real part of our life—and will be with us for years. Fires, tornadoes and other disasters, too, may strike without warning.

The very lives of your employees are at stake. Yours is a grave responsibility. Consider what may happen.

When the emergency comes, everybody's going to need help at the same time. It may be hours before outside aid reaches you. The best chance of survival for your workers—and the fastest way to get back into production—is to know what to do and be ready to do it. To be unprepared is to gamble with human lives. Disaster may happen TOMORROW. Insist that these simple precautions are taken TODAY:

☐ **Call your local** Civil Defense Director. He'll help you set up a plan for your offices and plant—a plan that's safer, because it's entirely integrated with community Civil Defense action.

☐ **Check contents** and locations of first-aid kits. Be sure they're adequate and up to date. Here again, your CD Director can help—with advice on supplies needed for injuries due to blast, radiation, etc.

☐ **Encourage personnel** to attend Red Cross First Aid Training Courses.

☐ **Encourage your staff** and your community to have their homes prepared. Run ads in your plant paper, in local newspapers, over TV and radio, on bulletin boards. Your CD Director can show you ads that you can sponsor locally. Set the standard of preparedness in your plant city. There's no better way of building prestige and good employee relations—and no greater way of helping America.

Act now . . . check off these four simple points . . . before it's too late.

cut brattice costs *with*

AIRTITE

DEMOUNTABLE STOPPINGS

Replace both wood brattices and concrete block brattices. Flexible enough to withstand blasting shocks close to face and enduring enough to last for years. Consist of vertical 24-gauge galvanized pans 12" wide with 3" flanges. Two pans telescope together to provide any height. Pans are clamped to two 2" x 2" steel angles mounted horizontally in holes drilled into rib about 1' and 5' from top. Have been approved by State and Federal mine inspectors after installation.

- **1 STOPPING REPLACES 2 BRATTICES**
- **LIGHTWEIGHT · EASY TO HAUL**
- **EASILY INSTALLED · 2 MEN · 2 HOURS**
- **EASILY RECOVERED AND REUSED**
- **PAY FOR THEMSELVES**

PAT. PEND.

WRITE TODAY FOR COMPLETE INFORMATION AND PRICES

TRI COUNTY BUILDING SERVICE

ALSO Manufacturers of Demountable Overcasts

P. O. BOX 405 · TAYLORVILLE, ILL.

Parmanco

HI-SPEED HORIZONTAL DRILL

Drills a 6-inch Hole in two-thirds the ordinary time

Included in the new design is an auger rack which saves on drilling time. The augers are on the machine as it is moved from hole to hole. Another feature, for faster set up and smoother drilling, is the four individually adjustable level jacks. Automotive steering is optional.

COMPLETELY RE-DESIGNED Around a 40 H. P. ENGINE

• This HI-SPEED DRILL is designed for drilling 5 - 6 - 8 inch holes to 100 feet or more. The 40 H. P. engine with four drilling speeds makes possible the reduction of footage time by one third. This new drill, the very latest in design, is equipped with self-starter and generator, dual type front wheels, truck type rear axle with hydraulic brakes and traction drive with both forward and reverse. Here is greater speed in retrieving augers and four rotating speeds and reverse for drilling and cleaning the hole. Here is accuracy and mobility. Here is the modern answer to faster, lower-cost drilling.

•

Send for Complete Details.

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PARIS MANUFACTURING CO.

PARIS, ILLINOIS

COAL AGE ADVERTISERS IN THIS ISSUE

MORE INFORMATION on any product advertised in COAL AGE may be easily secured by using the postage-free card facing p. 125.

Aeroquip Corp. ... 46
Allis-Chalmers Tractor Div. ... 20
Allis-Chalmers Mfg. Co. ... 33
Alloy Rods Co. ... 14-15
American Car & Foundry Co. ... Second Cover
American Cyanamid Co., Expl. Dept. ... Insert between pp. 36-37
American Manganese Steel Div., American Brake Shoe Co. ... 147
American Mine Door Co. ... 179
American Oil Co. ... 54
American Pulverizer Co. ... 60
American Steel & Wire Div. ... 8-9, 16-17, 66
Anaconda Wire & Cable Co. ... 50
Armco Drainage & Metal Products, Inc. ... 156
Armstrong-Bray & Co. ... 154
Athey Products Corp. ... 55

Baltimore & Ohio Railroad ... 143
Barber-Greene Co. ... 49
Bethlehem Steel Co. ... 30, 36, 48, 52
Bird Machine Co. ... 4
Bituminous Casualty Corp. ... 167
Bowdil Co. ... 31
Broderick & Bascom Rope Co. ... 61
Bucyrus-Erie Co. ... 26

Carboloy Dept. of General Electric Co. ... 44-45
Caterpillar Tractor Co. ... 124, 184
Chesapeake & Ohio Railway ... 22
Chevrolet Div., General Motors ... 28
Cities Service Oil Co. ... 139
Coal Operators Casualty Co. ... 171
Coffing Hoist Co. ... 159
Collyer Insulated Wire Co. ... 166
Columbia-Geneva Steel Div. ... 16,-17, 66

Deister Concentrator Co. ... 150
Detroit Diesel Engine Div., General Motors ... 21
Duff-Norton Mfg. Co. ... 127
duPont de Nemours & Co., E. I., Textile Fibers Dept. ... 38

Eaton Mfg. Co. ... 59
Eimco Corp. ... 42
Electric Storage Battery Co. ... 115
Electro Dynamic Div. of General Dynamics Corp. ... 130
Ensign-Bickford Co. ... 68
Ensign Electric Co. ... 159
Euclid Div., General Motors ... 41

Fairbanks, Morse & Co. ... 62
Fairmont Machinery Co. ... 27
Flexible Steel Lacing Co. ... 171
Flood City Brass & Electric Co. ... 165

General Cable Corp. ... 52A
General Electric Co. ... 18-19
Goodman Mfg. Co. ... 12-13
Goodrich Co., B. F. ... 1
Goodyear Tire & Rubber Co. ... 23
Gorman-Rupp Co. ... 160
Gulf Oil Corp. ... 47
Gulf Refining Co. ... 47
Gustin-Bacon Mfg. Co. ... 168
Guyan Machinery Co. ... 170

Hamilton Rubber Mfg. Corp. ... 155
Harnischfeger Corp. ... 35
Hazard Insulated Wire Works, Div. of The Okonite Co. ... 57
Heil Co. ... 169
Hendrick Mfg. Co. ... 165
Hercules Powder Co. ... 34
Homer Mfg. Co. ... 179
Hough Co., Frank G. ... 131
Hulburt Oil & Grease Co. ... 2-3

Indiana Foundry Co. ... 179
International Harvester Co. ... 123

Jeffrey Mfg. Co. ... 10-11
Jones & Laughlin Steel Corp. ... 58, 65
Joy Mfg. Co. ... Insert between pp. 20-21

Kennametal, Inc. ... 107
King Powder Co. ... 148

LeRoi Co., Transo Div. ... 53
Lee-Norse Co. ... 161
Leschen Wire Rope Div., H. K. Porter Co., Inc. ... 121
Link-Belt Co. ... 67, Fourth Cover
Long Co. ... 152

Macwhyte Co. ... 125
Marion Power Shovel Co. ... 141
Merrick Scale Co. ... 157
Mine Safety Appliances Co. ... 151

National Tube Div. ... 16-17
Neff & Fry Co. ... 170
New York Central Railroad ... 133
Nolan Co. ... 167

Ohio Brass Co. ... Insert between pp. 116-117
Osmose Wood Preserving Co. of America ... 128

Paris Mfg. Co. ... 181
Pennsylvania Drilling Co. ... 179
Post-Clover Electric Co. ... 158
Pure Oil Co. ... 63

Republic Steel Corp., Bolt & Nut Div. ... 56
Roberts & Schaefer Co. ... 64
Roebling's Sons Corp., John A. ... 37
Rollway Bearing Co. ... 32
Ruberoid Co. ... 132
Rust-Oleum Corp. ... 51

Salem Tool Co. ... 183
Scandinavia Belting Co. ... 134
Schramm, Inc. ... 157
Searchlight Section ... 173-177
Simplex Wire & Cable Co. ... 25
Sinclair Refining Co. ... 137
Socony-Vacuum Oil Co. ... 113
Spang & Co. ... 154
Sprague & Henwood, Inc. ... 164
Stamler Co., W. R. ... 164
Standard Oil Co. (Indiana) ... 43
Sterling Steel Casting Co. ... 129

Templeton, Kenly & Co. ... 162
Tennessee Coal & Iron Div. ... 16-17, 66
Texas Co. ... 6-7
Thermoid Co. ... 29
Timken Roller Bearing Co. ... 39
Tool Steel Gear & Pinion Co. ... Insert between pp. 52-53
Tri-County Building Service ... 181
Twin Disc Clutch Co. ... 163

United States Rubber Co., Electrical Wire & Cable Dept. ... 109
United States Rubber Co., Mechanical Goods Div. ... Third Cover
United States Steel Corp. ... 8-9, 16-17, 66
United States Steel Export Co. ... 16-17, 66
United States Steel Supply Div. ... 16-17

Vulcan Iron Works ... 40

Wellman Engrg. Co. ... 36A
Western Machinery Co. ... 111
Wilmot Engrg. Co. ... 153

Youngstown Sheet & Tube Co. ... 24

PROFESSIONAL SERVICES ... 173

SEARCHLIGHT SECTION
(Classified Advertising)
H. E. Hilty, Mgr.

EMPLOYMENT
Positions Vacant ... 173
BUSINESS OPPORTUNITIES
Offered ... 173
PROPERTY
For Sale ... 173
EQUIPMENT
(Used or Surplus New)
For Rent ... 173
For Sale ... 174-177
Pipe ... 177
Rail ... 174
WANTED
Equipment ... 176

ADVERTISERS INDEX

Alabama Power Co. ... 176
Albert Pipe Supply Co., Inc. ... 177
Allied Construction Equipment Co. ... 176
Benney Equipment Co., R. H. ... 174
Boston Metals Co., Inc. ... 177
Brown Equipment Co. ... 176
Chesapeake & Ohio Railway Co. ... 174
Coal Mine Equipment Sales Co. ... 174
Electric Equipment Co. ... 174
Electric Service Co., Inc. ... 174
Fish & Co., J. T. ... 177
Frank, M. K. ... 174
G & R Coal Co. ... 173
Greensburg Machine Co. ... 174
Hawkins & Co. ... 176
Heller, Albert ... 176
Ironton Engine Co. ... 174
Lefton Industrial Co. ... 174
Moorhead Electrical Machinery Co. ... 174
Morse Bros. Machy. Co. ... 175
National Business Exchange ... 176
Nugget Coal & Timber Co. ... 173
O'Neill, A. J. ... 174
Peerless Coal Inc. ... 176
Schoonmaker Co., Inc., A. G. ... 176
Sherwood Construction Co., A. G. ... 176
Smith Co., H. Y. ... 176
Snap Creek Coal Co. ... 174
Telephone Engineering Co. ... 174
Western Pocahontas Corp. ... 174
P 1918 ... 173
FS 2092 ... 177

This index is published as a convenience to the reader. Every care is taken to make it accurate, but C. A. assumes no responsibility for errors or omissions.

SALEM

McCarthy

SELF-MOVING DRILL

HEAVY – RUGGED – POWERFUL

McCarthy barrel type cutting head produces maximum quality and quantity of lump coal.

42" COAL RECOVERY DRILL

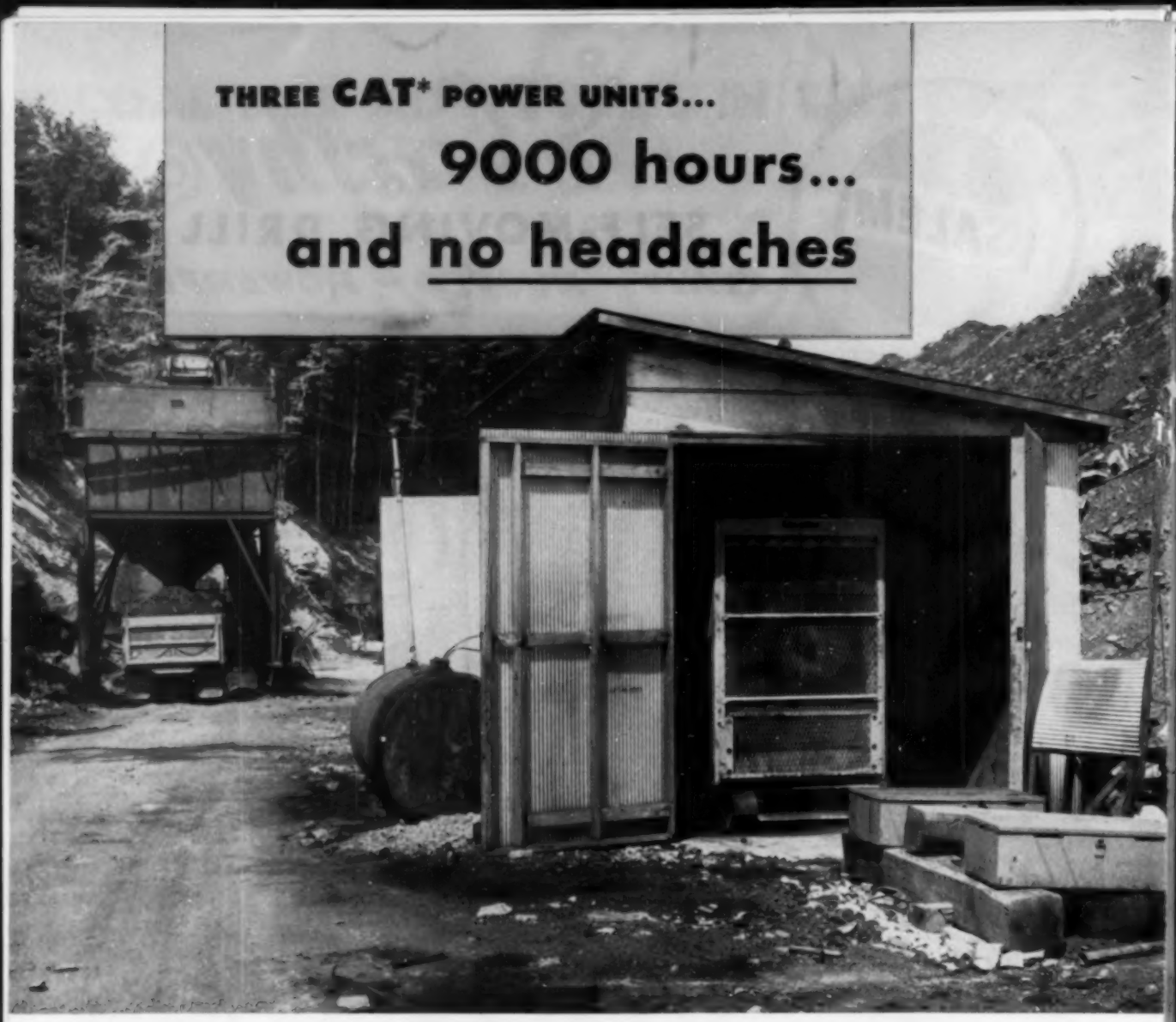
Mining Low-Cost Quality Coal . . .

This hydraulically self-moving 42" McCarthy Coal Recovery Drill is mining up to 500 tons of clean, low-cost, quality coal per day at Hodgeville, West Virginia. It has a three-man crew — operates in pits as narrow as 34 feet. Operator has all-around clear vision, including highwall. Jacks, hydraulically operated, lift 48 inches. Model 12 is built to handle augers 24 feet long from 16 inches to 48 inches in diameter as specified. Other McCarthy Coal Recovery Drills use augers 4, 6 and 12 feet in length.

THE SALEM TOOL COMPANY

763 SOUTH ELLSWORTH AVE. • SALEM, OHIO, U. S. A.

THE SALEM TOOL COMPANY SALEM SALEM, OHIO, U. S. A.



THREE CAT* POWER UNITS...

9000 hours... and no headaches

Cavalier Peerless Coal Co., operating 7½ miles south of Pickens, West Virginia, installed a Cat D375 Electric Set in 1952. The electrical load includes four 15-HP Joy shuttle buggies, two 30-HP Joy loading machines, one 74-HP Joy cutting machine, one 20-HP fan motor, three 20-HP chain conveyor motors, one 30-HP drag conveyor motor and miscellaneous small motors, pumps and lights.

At an adjacent stripping operation the company has a Caterpillar D375 Engine and a D364 Engine in two P & H high lift shovels. They have stripped six million yards of extremely tough rock overburden on this job.

And here's the payoff: after *9000 hours* of combined operation through heat and cold and heavy dust, owner D. S. Blount says, "These three Cat Engines have given excellent, satisfactory service *with very low maintenance and operating cost.*"

Cavalier Peerless also owns five Caterpillar D8 Tractors. These eight Caterpillar units are cutting costs for the owner in many ways. First, through low down time. Second, through low maintenance costs. Third, through low consumption of money-saving No. 2 furnace oil. Fourth, through efficient operation: because Cat Engines are honestly rated, you know they'll do the job you bought them to do.

There are 12 sizes of Caterpillar Engines and Electric Sets, to 500 HP and 315 KW. Your Caterpillar Dealer—who stands back of his sales with dependable service and genuine factory parts—will gladly help you select the Caterpillar unit that's "tailor-made" for *you*.

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Both Cat and Caterpillar are registered trademarks—®

SPECIFY CAT POWER FOR HIGH-PROFIT PERFORMANCE

Reinsulate with U. S. Uskorona and "D. R." Tapes

A cable becomes as good as new when you reinsulate with Uskorona and re-jacket with "D.R." splicing compound. The "D.R." compound provides an outside vulcanized covering. These completely reliable tapes give:

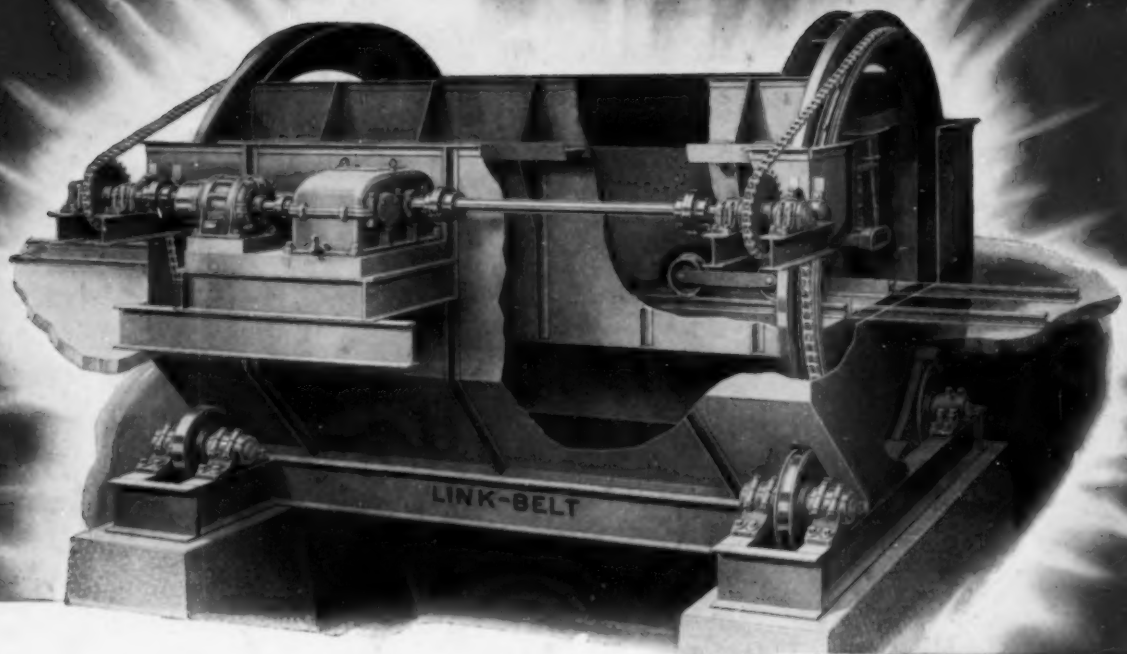
- Extra-tight grip plus high tensile strength.
- They stand up under acid, alkalies and moisture... ideal for mining machine cables.
- Dangerous leaks can't occur, because pinholes are impossible.
- Absolutely waterproof.

Like all the tapes and splicing compounds in United States Rubber Company's complete line, Uskorona was developed for specific operating conditions, yet can handle a wide range of electrical and general purpose jobs. It exceeds A.S.T.M. specifications. Get in touch with any of our numerous distributors or one of our 25 District Sales Offices, or write to address below.

"U.S." Research perfects it
"U.S." Production builds it
U.S. Industry depends on it

UNITED STATES RUBBER COMPANY
MECHANICAL GOODS DIVISION · ROCKEFELLER CENTER, NEW YORK 20, N. Y.

Yes, LINK-BELT positive-drive dumper cuts mine car unloading costs



Handles all sizes and types of mine cars suitable for rotary dumping

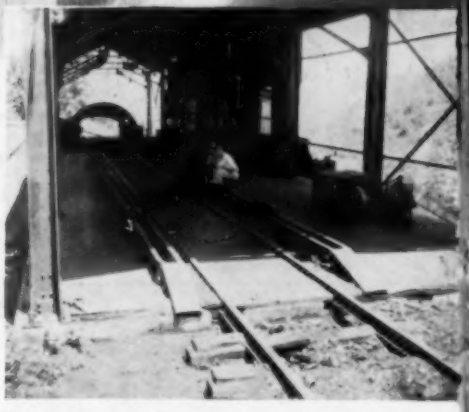
Where there is excessive moisture—when coal is mined from a wet seam or sprayed to keep down dust—the Link-Belt *Positive-Drive* Rotary Mine Car Dumper saves time and cuts your unloading costs.

This chain-driven dumper supplements Link-Belt's traction type. Both dumpers can be adapted to widely varying conditions. Both are built for full 360 degree rotation, and both will handle one or more cars, in train if desired. Regardless of the type of car, shockless, gentle handling and fast, automatic operation are assured.

To find out how you can speed car handling with fewer man-hours per ton, call the Link-Belt office near you. And, remember, car dumpers are only a part of the complete range of coal handling and preparation machinery engineered and built by Link-Belt.

LINK-BELT COMPANY: Chicago 9, Philadelphia 40, Colmar, Pa., Pittsburgh 13, Wilkes-Barre, Huntington 9, W. Va., Louisville 2, Denver 2, Kansas City 8, Mo., Cleveland 15, Indianapolis 6, Detroit 4, Birmingham 3, St. Louis, Salt Lake City 1, Seattle 4, Toronto 8, Springs (South Africa), Sydney (Australia).

12,980-A



Link-Belt car haul, automatic spacing equipment and rotary car dumper are automatically coordinated for fast, smooth weighing, stopping and dumping.

LINK-BELT

COAL PREPARATION and HANDLING EQUIPMENT